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60/237,963 4 October 2000 (04.10.2000) US(71) Applicants (for all designated States except US):
SMITHKLINE BEECHAM CORPORATION
[US/US]; One Franklin Plaza, Philadelphia, PA 19103
(US). **SMITHKLINE BEECHAM P.L.C.** [GB/GB]; New
Horizons Court, Great West Road, Brentford, Middlesex
TW8 9EP (GB).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **AGARWAL,**
Pankaj [IN/US]; 251 West DeKalb Pike, King of Prussia,
PA 19406 (US). **KABNICK, Karen, S.** [US/US]; 4138
Presidential Drive, Lafayette Hill, PA 19444 (US). **MUR-**
DOCH, Paul, R. [GB/GB]; New Frontiers Science Park
South, Third Avenue, Harlow, Essex CM19 5AW (GB).**RIZVI, Safia, K.** [PK/US]; 4617 Pine Street, Philadel-
phia, PA 19143 (US). **SMITH, Randall, F.** [US/US];
4138 Presidential Drive, Lafayette Hill, PA 19444 (US).
XIANG, Zahoying [CN/US]; 2413 Ridgeway, Fort Lee,
NJ 07024 (US).(74) Agents: **HECHT, Elisabeth, J.** et al.; SmithKline
Beecham Corporation, Corporate Intellectual Property,
UW 2220, 709 Swedeland Road, P.O. Box 1539, King of
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(54) Title: NOVEL COMPOUNDS

(57) Abstract: Polypeptides and polynucleotides of the genes set forth in Table I and methods for producing such polypeptides by recombinant techniques are disclosed. Also disclosed are methods for utilizing polypeptides and polynucleotides of the genes set forth in Table I in diagnostic assays.

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Novel Compounds

Field of Invention

This invention relates to newly identified polypeptides and polynucleotides encoding such polypeptides, to their use in diagnosis and in identifying compounds that may be agonists, antagonists that are potentially useful in therapy, and to production of such polypeptides and polynucleotides. The polynucleotides and polypeptides of the present invention also relate to proteins with signal sequences which allow them to be secreted extracellularly or membrane-associated (hereinafter often referred collectively as secreted proteins or secreted polypeptides).

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Background of the Invention

The drug discovery process is currently undergoing a fundamental revolution as it embraces "functional genomics", that is, high throughput genome- or gene-based biology. This approach as a means to identify genes and gene products as therapeutic targets is rapidly superseding earlier approaches based on "positional cloning". A phenotype, that is a biological function or genetic disease, would be identified and this would then be tracked back to the responsible gene, based on its genetic map position.

Functional genomics relies heavily on high-throughput DNA sequencing technologies and the various tools of bioinformatics to identify gene sequences of potential interest from the many molecular biology databases now available. There is a continuing need to identify and characterise further genes and their related polypeptides/proteins, as targets for drug discovery.

Proteins and polypeptides that are naturally secreted into blood, lymph and other body fluids, or secreted into the cellular membrane are of primary interest for pharmaceutical research and development. The reason for this interest is the relative ease to target protein therapeutics into their place of action (body fluids or the cellular membrane). The natural pathway for protein secretion into extracellular space is the endoplasmic reticulum in eukaryotes and the inner membrane in prokaryotes (Palade, 1975, Science, 189, 347; Milstein, Brownlee, Harrison, and Mathews, 1972, Nature New Biol., 239, 117; Blobel, and Dobberstein, 1975, J. Cell. Biol., 67, 835). On the other hand, there is no known natural pathway for exporting a protein from the exterior of the cells into the cytosol (with the exception of pinocytosis, a mechanism of snake venom toxin intrusion into cells). Therefore targeting protein therapeutics into cells poses extreme difficulties.

The secreted and membrane-associated proteins include but are not limited to all peptide hormones and their receptors (including but not limited to insulin, growth hormones, chemokines, cytokines, neuropeptides, integrins, kallikreins, lamins, melanins, natriuretic hormones, neuropeptide, neurotrophins, pituitary hormones, pleiotropins,

prostaglandins, secretogranins, selectins, thromboglobulins, thymosins), the breast and colon cancer gene products, leptin, the obesity gene protein and its receptors, serum albumin, superoxide dismutase, spliceosome proteins, 7TM (transmembrane) proteins also called as G-protein coupled receptors, immunoglobulins, several families of serine proteinases (including but not limited to proteins of the blood coagulation cascade, digestive enzymes), deoxyribonuclease I, etc.

Therapeutics based on secreted or membrane-associated proteins approved by FDA or foreign agencies include but are not limited to insulin, glucagon, growth hormone, chorionic gonadotropin, follicle stimulating hormone, luteinizing hormone, calcitonin, adrenocorticotrophic hormone (ACTH), vasopressin, interleukines, interferones, immunoglobulins, lactoferrin (diverse products marketed by several companies), tissue-type plasminogen activator (Alteplase by Genentech), hyaluronidase (Wydase by Wyeth-Ayerst), dornase alpha (Pulmozyme by Genentech), Chymodiactin (chymopapain by Knoll), alglucerase (Ceredase by Genzyme), streptokinase (Kabikinase by Pharmacia) (Streptase by Astra), etc. This indicates that secreted and membrane-associated proteins have an established, proven history as therapeutic targets. Clearly, there is a need for identification and characterization of further secreted and membrane-associated proteins which can play a role in preventing, ameliorating or correcting dysfunction or disease, including but not limited to diabetes, breast-, prostate-, colon cancer and other malignant tumors, hyper- and hypotension, obesity, bulimia, anorexia, growth abnormalities, asthma, manic depression, dementia, delirium, mental retardation, Huntington's disease, Tourette's syndrome, schizophrenia, growth, mental or sexual development disorders, and dysfunctions of the blood cascade system including those leading to stroke. The proteins of the present invention which include the signal sequences are also useful to further elucidate the mechanism of protein transport which at present is not entirely understood, and thus can be used as research tools.

Summary of the Invention

The present invention relates to particular polypeptides and polynucleotides of the genes set forth in Table I, including recombinant materials and methods for their production. Such polypeptides and polynucleotides are of interest in relation to methods of treatment of certain diseases, including, but not limited to, the diseases set forth in Tables III and V, hereinafter referred to as "diseases of the invention". In a further aspect, the invention relates to methods for identifying agonists and antagonists (*e.g.*, inhibitors) using the materials provided by the invention, and treating conditions associated with imbalance of polypeptides and/or polynucleotides of the genes set forth in Table I with the identified compounds. In still a further aspect, the invention

relates to diagnostic assays for detecting diseases associated with inappropriate activity or levels the genes set forth in Table I. Another aspect of the invention concerns a polynucleotide comprising any of the nucleotide sequences set forth in the Sequence Listing and a polypeptide comprising a polypeptide encoded by the nucleotide sequence. In another aspect, the invention relates to a polypeptide comprising any of the polypeptide sequences set forth in the Sequence Listing and recombinant materials and methods for their production. Another aspect of the invention relates to methods for using such polypeptides and polynucleotides. Such uses include the treatment of diseases, abnormalities and disorders (hereinafter simply referred to as diseases) caused by abnormal expression, production, function and or metabolism of the genes of this invention, and such diseases are readily apparent by those skilled in the art from the homology to other proteins disclosed for each attached sequence. In still another aspect, the invention relates to methods to identify agonists and antagonists using the materials provided by the invention, and treating conditions associated with the imbalance with the identified compounds. Yet another aspect of the invention relates to diagnostic assays for detecting diseases associated with inappropriate activity or levels of the secreted proteins of the present invention.

Description of the Invention

In a first aspect, the present invention relates to polypeptides the genes set forth in Table I. Such polypeptides include:

- (a) an isolated polypeptide encoded by a polynucleotide comprising a sequence set forth in the Sequence Listing, herein when referring to polynucleotides or polypeptides of the Sequence Listing, a reference is also made to the Sequence Listing referred to in the Sequence Listing;
- (b) an isolated polypeptide comprising a polypeptide sequence having at least 95%, 96%, 97%, 98%, or 99% identity to a polypeptide sequence set forth in the Sequence Listing;
- (c) an isolated polypeptide comprising a polypeptide sequence set forth in the Sequence Listing;
- (d) an isolated polypeptide having at least 95%, 96%, 97%, 98%, or 99% identity to a polypeptide sequence set forth in the Sequence Listing;
- (e) a polypeptide sequence set forth in the Sequence Listing; and
- (f) an isolated polypeptide having or comprising a polypeptide sequence that has an Identity Index of 0.95, 0.96, 0.97, 0.98, or 0.99 compared to a polypeptide sequence set forth in the Sequence Listing;
- (g) fragments and variants of such polypeptides in (a) to (f).

Polypeptides of the present invention are believed to be members of the gene families set forth in Table II. They are therefore of therapeutic and diagnostic interest for the reasons set forth in Tables III and V. The biological properties of the polypeptides and polynucleotides of the genes

set forth in Table I are hereinafter referred to as "the biological activity" of polypeptides and polynucleotides of the genes set forth in Table I. Preferably, a polypeptide of the present invention exhibits at least one biological activity of the genes set forth in Table I.

Polypeptides of the present invention also include variants of the aforementioned polypeptides, including all allelic forms and splice variants. Such polypeptides vary from the reference polypeptide by insertions, deletions, and substitutions that may be conservative or non-conservative, or any combination thereof. Particularly preferred variants are those in which several, for instance from 50 to 30, from 30 to 20, from 20 to 10, from 10 to 5, from 5 to 3, from 3 to 2, from 2 to 1 or 1 amino acids are inserted, substituted, or deleted, in any combination.

Preferred fragments of polypeptides of the present invention include an isolated polypeptide comprising an amino acid sequence having at least 30, 50 or 100 contiguous amino acids from an amino acid sequence set forth in the Sequence Listing, or an isolated polypeptide comprising an amino acid sequence having at least 30, 50 or 100 contiguous amino acids truncated or deleted from an amino acid sequence set forth in the Sequence Listing. Preferred fragments are biologically active fragments that mediate the biological activity of polypeptides and polynucleotides of the genes set forth in Table I, including those with a similar activity or an improved activity, or with a decreased undesirable activity. Also preferred are those fragments that are antigenic or immunogenic in an animal, especially in a human.

Fragments of a polypeptide of the invention may be employed for producing the corresponding full-length polypeptide by peptide synthesis; therefore, these variants may be employed as intermediates for producing the full-length polypeptides of the invention. A polypeptide of the present invention may be in the form of the "mature" protein or may be a part of a larger protein such as a precursor or a fusion protein. It is often advantageous to include an additional amino acid sequence that contains secretory or leader sequences, pro-sequences, sequences that aid in purification, for instance multiple histidine residues, or an additional sequence for stability during recombinant production.

Polypeptides of the present invention can be prepared in any suitable manner, for instance by isolation from naturally occurring sources, from genetically engineered host cells comprising expression systems (*vide infra*) or by chemical synthesis, using for instance automated peptide synthesizers, or a combination of such methods. Means for preparing such polypeptides are well understood in the art.

In a further aspect, the present invention relates to polynucleotides of the genes set forth in Table I. Such polynucleotides include:

(a) an isolated polynucleotide comprising a polynucleotide sequence having at least 95%, 96%, 97%, 98%, or 99% identity to a polynucleotide sequence set forth in the Sequence Listing;

- (b) an isolated polynucleotide comprising a polynucleotide set forth in the Sequence Listing;
- (c) an isolated polynucleotide having at least 95%, 96%, 97%, 98%, or 99% identity to a polynucleotide set forth in the Sequence Listing;
- (d) an isolated polynucleotide set forth in the Sequence Listing;
- 5 (e) an isolated polynucleotide comprising a polynucleotide sequence encoding a polypeptide sequence having at least 95%, 96%, 97%, 98%, or 99% identity to a polypeptide sequence set forth in the Sequence Listing;
- (f) an isolated polynucleotide comprising a polynucleotide sequence encoding a polypeptide set forth in the Sequence Listing;
- 10 (g) an isolated polynucleotide having a polynucleotide sequence encoding a polypeptide sequence having at least 95%, 96%, 97%, 98%, or 99% identity to a polypeptide sequence set forth in the Sequence Listing;
- (h) an isolated polynucleotide encoding a polypeptide set forth in the Sequence Listing;
- (i) an isolated polynucleotide having or comprising a polynucleotide sequence that has an Identity
- 15 Index of 0.95, 0.96, 0.97, 0.98, or 0.99 compared to a polynucleotide sequence set forth in the Sequence Listing;
- (j) an isolated polynucleotide having or comprising a polynucleotide sequence encoding a polypeptide sequence that has an Identity Index of 0.95, 0.96, 0.97, 0.98, or 0.99 compared to a polypeptide sequence set forth in the Sequence Listing; and
- 20 polynucleotides that are fragments and variants of the above mentioned polynucleotides or that are complementary to above mentioned polynucleotides, over the entire length thereof.

Preferred fragments of polynucleotides of the present invention include an isolated polynucleotide comprising an nucleotide sequence having at least 15, 30, 50 or 100 contiguous nucleotides from a sequence set forth in the Sequence Listing, or an isolated polynucleotide

25 comprising a sequence having at least 30, 50 or 100 contiguous nucleotides truncated or deleted from a sequence set forth in the Sequence Listing.

Preferred variants of polynucleotides of the present invention include splice variants, allelic variants, and polymorphisms, including polynucleotides having one or more single nucleotide polymorphisms (SNPs).

30 Polynucleotides of the present invention also include polynucleotides encoding polypeptide variants that comprise an amino acid sequence set forth in the Sequence Listing and in which several, for instance from 50 to 30, from 30 to 20, from 20 to 10, from 10 to 5, from 5 to 3, from 3 to 2, from 2 to 1 or 1 amino acid residues are substituted, deleted or added, in any combination.

In a further aspect, the present invention provides polynucleotides that are RNA transcripts of the DNA sequences of the present invention. Accordingly, there is provided an RNA polynucleotide that:

(a) comprises an RNA transcript of the DNA sequence encoding a polypeptide set forth in the Sequence Listing;

(b) is a RNA transcript of a DNA sequence encoding a polypeptide set forth in the Sequence Listing;

(c) comprises an RNA transcript of a DNA sequence set forth in the Sequence Listing; or

(d) is a RNA transcript of a DNA sequence set forth in the Sequence Listing;

and RNA polynucleotides that are complementary thereto.

The polynucleotide sequences set forth in the Sequence Listing show homology with the polynucleotide sequences set forth in Table II. A polynucleotide sequence set forth in the Sequence Listing is a cDNA sequence that encodes a polypeptide set forth in the Sequence Listing. A polynucleotide sequence encoding a polypeptide set forth in the Sequence Listing may be identical to a polypeptide encoding a sequence set forth in the Sequence Listing or it may be a sequence other than a sequence set forth in the Sequence Listing, which, as a result of the redundancy (degeneracy) of the genetic code, also encodes a polypeptide set forth in the Sequence Listing. A polypeptide of a sequence set forth in the Sequence Listing is related to other proteins of the gene families set forth in Table II, having homology and/or structural similarity with the polypeptides set forth in Table II. Preferred polypeptides and polynucleotides of the present invention are expected to have, *inter alia*, similar biological functions/properties to their homologous polypeptides and polynucleotides. Furthermore, preferred polypeptides and polynucleotides of the present invention have at least one activity of the genes set forth in Table I.

Polynucleotides of the present invention may be obtained using standard cloning and screening techniques from a cDNA library derived from mRNA from the tissues set forth in Table IV (see for instance, Sambrook *et al.*, Molecular Cloning: A Laboratory Manual, 2nd Ed., Cold Spring Harbor Laboratory Press, Cold Spring Harbor, N.Y. (1989)). Polynucleotides of the invention can also be obtained from natural sources such as genomic DNA libraries or can be synthesized using well known and commercially available techniques.

When polynucleotides of the present invention are used for the recombinant production of polypeptides of the present invention, the polynucleotide may include the coding sequence for the mature polypeptide, by itself, or the coding sequence for the mature polypeptide in reading frame with other coding sequences, such as those encoding a leader or secretory sequence, a pre-, or pro- or prepro- protein sequence, or other fusion peptide portions. For example, a marker sequence that facilitates purification of the fused polypeptide can be encoded. In certain preferred embodiments

of this aspect of the invention, the marker sequence is a hexa-histidine peptide, as provided in the pQE vector (Qiagen, Inc.) and described in Gentz *et al.*, Proc Natl Acad Sci USA (1989) 86:821-824, or is an HA tag. A polynucleotide may also contain non-coding 5' and 3' sequences, such as transcribed, non-translated sequences, splicing and polyadenylation signals, ribosome binding sites and sequences that stabilize mRNA.

Polynucleotides that are identical, or have sufficient identity to a polynucleotide sequence set forth in the Sequence Listing, may be used as hybridization probes for cDNA and genomic DNA or as primers for a nucleic acid amplification reaction (for instance, PCR). Such probes and primers may be used to isolate full-length cDNAs and genomic clones encoding polypeptides of the present invention and to isolate cDNA and genomic clones of other genes (including genes encoding paralogs from human sources and orthologs and paralogs from species other than) that have a high sequence similarity to sequences set forth in the Sequence Listing, typically at least 95% identity. Preferred probes and primers will generally comprise at least 15 nucleotides, preferably, at least 30 nucleotides and may have at least 50, if not at least 100 nucleotides.

Particularly preferred probes will have between 30 and 50 nucleotides. Particularly preferred primers will have between 20 and 25 nucleotides.

A polynucleotide encoding a polypeptide of the present invention, including homologs from species other than , may be obtained by a process comprising the steps of screening a library under stringent hybridization conditions with a labeled probe having a sequence set forth in the Sequence Listing or a fragment thereof, preferably of at least 15 nucleotides; and isolating full-length cDNA and genomic clones containing the polynucleotide sequence set forth in the Sequence Listing. Such hybridization techniques are well known to the skilled artisan. Preferred stringent hybridization conditions include overnight incubation at 42°C in a solution comprising: 50% formamide, 5xSSC (150mM NaCl, 15mM trisodium citrate), 50 mM sodium phosphate (pH 7.6), 5x Denhardt's solution, 10 % dextran sulfate, and 20 microgram/ml denatured, sheared salmon sperm DNA; followed by washing the filters in 0.1x SSC at about 65°C. Thus the present invention also includes isolated polynucleotides, preferably with a nucleotide sequence of at least 100, obtained by screening a library under stringent hybridization conditions with a labeled probe having the sequence set forth in the Sequence Listing or a fragment thereof, preferably of at least 15 nucleotides.

The skilled artisan will appreciate that, in many cases, an isolated cDNA sequence will be incomplete, in that the region coding for the polypeptide does not extend all the way through to the 5' terminus. This is a consequence of reverse transcriptase, an enzyme with inherently low "processivity" (a measure of the ability of the enzyme to remain attached to the template during the

polymerisation reaction), failing to complete a DNA copy of the mRNA template during first strand cDNA synthesis.

There are several methods available and well known to those skilled in the art to obtain full-length cDNAs, or extend short cDNAs, for example those based on the method of Rapid Amplification of cDNA ends (RACE) (see, for example, Frohman et al., Proc Nat Acad Sci USA 85, 8998-9002, 1988). Recent modifications of the technique, exemplified by the Marathon (trade mark) technology (Clontech Laboratories Inc.) for example, have significantly simplified the search for longer cDNAs. In the Marathon (trade mark) technology, cDNAs have been prepared from mRNA extracted from a chosen tissue and an 'adaptor' sequence ligated onto each end. Nucleic acid amplification (PCR) is then carried out to amplify the "missing" 5' end of the cDNA using a combination of gene specific and adaptor specific oligonucleotide primers. The PCR reaction is then repeated using 'nested' primers, that is, primers designed to anneal within the amplified product (typically an adapter specific primer that anneals further 3' in the adaptor sequence and a gene specific primer that anneals further 5' in the known gene sequence). The products of this reaction can then be analyzed by DNA sequencing and a full-length cDNA constructed either by joining the product directly to the existing cDNA to give a complete sequence, or carrying out a separate full-length PCR using the new sequence information for the design of the 5' primer.

Recombinant polypeptides of the present invention may be prepared by processes well known in the art from genetically engineered host cells comprising expression systems. Accordingly, in a further aspect, the present invention relates to expression systems comprising a polynucleotide or polynucleotides of the present invention, to host cells which are genetically engineered with such expression systems and to the production of polypeptides of the invention by recombinant techniques. Cell-free translation systems can also be employed to produce such proteins using RNAs derived from the DNA constructs of the present invention.

For recombinant production, host cells can be genetically engineered to incorporate expression systems or portions thereof for polynucleotides of the present invention. Polynucleotides may be introduced into host cells by methods described in many standard laboratory manuals, such as Davis et al., Basic Methods in Molecular Biology (1986) and Sambrook *et al.* (*ibid*). Preferred methods of introducing polynucleotides into host cells include, for instance, calcium phosphate transfection, DEAE-dextran mediated transfection, transvection, micro-injection, cationic lipid-mediated transfection, electroporation, transduction, scrape loading, ballistic introduction or infection.

Representative examples of appropriate hosts include bacterial cells, such as *Streptococci*, *Staphylococci*, *E. coli*, *Streptomyces* and *Bacillus subtilis* cells; fungal cells, such as yeast cells and

Aspergillus cells; insect cells such as *Drosophila* S2 and *Spodoptera* Sf9 cells; animal cells such as CHO, COS, HeLa, C127, 3T3, BHK, HEK 293 and Bowes melanoma cells; and plant cells.

A great variety of expression systems can be used, for instance, chromosomal, episomal and virus-derived systems, *e.g.*, vectors derived from bacterial plasmids, from bacteriophage, from transposons, from yeast episomes, from insertion elements, from yeast chromosomal elements, from viruses such as baculoviruses, papova viruses, such as SV40, vaccinia viruses, adenoviruses, fowl pox viruses, pseudorabies viruses and retroviruses, and vectors derived from combinations thereof, such as those derived from plasmid and bacteriophage genetic elements, such as cosmids and phagemids. The expression systems may contain control regions that regulate as well as engender expression. Generally, any system or vector that is able to maintain, propagate or express a polynucleotide to produce a polypeptide in a host may be used. The appropriate polynucleotide sequence may be inserted into an expression system by any of a variety of well-known and routine techniques, such as, for example, those set forth in Sambrook *et al.*, (*ibid*). Appropriate secretion signals may be incorporated into the desired polypeptide to allow secretion of the translated protein into the lumen of the endoplasmic reticulum, the periplasmic space or the extracellular environment. These signals may be endogenous to the polypeptide or they may be heterologous signals.

If a polypeptide of the present invention is to be expressed for use in screening assays, it is generally preferred that the polypeptide be produced at the surface of the cell. In this event, the cells may be harvested prior to use in the screening assay. If the polypeptide is secreted into the medium, the medium can be recovered in order to recover and purify the polypeptide. If produced intracellularly, the cells must first be lysed before the polypeptide is recovered.

Polypeptides of the present invention can be recovered and purified from recombinant cell cultures by well-known methods including ammonium sulfate or ethanol precipitation, acid extraction, anion or cation exchange chromatography, phosphocellulose chromatography, hydrophobic interaction chromatography, affinity chromatography, hydroxylapatite chromatography and lectin chromatography. Most preferably, high performance liquid chromatography is employed for purification. Well known techniques for refolding proteins may be employed to regenerate active conformation when the polypeptide is denatured during intracellular synthesis, isolation and/or purification.

Polynucleotides of the present invention may be used as diagnostic reagents, through detecting mutations in the associated gene. Detection of a mutated form of a gene is characterized by the polynucleotides set forth in the Sequence Listing in the cDNA or genomic sequence and which is associated with a dysfunction. Will provide a diagnostic tool that can add to, or define, a diagnosis of a disease, or susceptibility to a disease, which results from under-expression, over-

expression or altered spatial or temporal expression of the gene. Individuals carrying mutations in the gene may be detected at the DNA level by a variety of techniques well known in the art.

Nucleic acids for diagnosis may be obtained from a subject's cells, such as from blood, urine, saliva, tissue biopsy or autopsy material. The genomic DNA may be used directly for
5 detection or it may be amplified enzymatically by using PCR, preferably RT-PCR, or other amplification techniques prior to analysis. RNA or cDNA may also be used in similar fashion. Deletions and insertions can be detected by a change in size of the amplified product in comparison to the normal genotype. Point mutations can be identified by hybridizing amplified
10 DNA to labeled nucleotide sequences of the genes set forth in Table I. Perfectly matched sequences can be distinguished from mismatched duplexes by RNase digestion or by differences in melting temperatures. DNA sequence difference may also be detected by alterations in the electrophoretic mobility of DNA fragments in gels, with or without denaturing agents, or by direct DNA sequencing (see, for instance, Myers *et al.*, Science (1985) 230:1242). Sequence changes at specific locations may also be revealed by nuclease protection assays, such as RNase and S1
15 protection or the chemical cleavage method (see Cotton *et al.*, Proc Natl Acad Sci USA (1985) 85: 4397-4401).

An array of oligonucleotides probes comprising polynucleotide sequences or fragments thereof of the genes set forth in Table I can be constructed to conduct efficient screening of *e.g.*, genetic mutations. Such arrays are preferably high density arrays or grids. Array technology
20 methods are well known and have general applicability and can be used to address a variety of questions in molecular genetics including gene expression, genetic linkage, and genetic variability, see, for example, M. Chee *et al.*, Science, 274, 610-613 (1996) and other references cited therein. Detection of abnormally decreased or increased levels of polypeptide or mRNA expression may also be used for diagnosing or determining susceptibility of a subject to a disease of the invention.
25 Decreased or increased expression can be measured at the RNA level using any of the methods well known in the art for the quantitation of polynucleotides, such as, for example, nucleic acid amplification, for instance PCR, RT-PCR, RNase protection, Northern blotting and other hybridization methods. Assay techniques that can be used to determine levels of a protein, such as a polypeptide of the present invention, in a sample derived from a host are well-known to those of
30 skill in the art. Such assay methods include radio-immunoassays, competitive-binding assays, Western Blot analysis and ELISA assays.

Thus in another aspect, the present invention relates to a diagnostic kit comprising:
(a) a polynucleotide of the present invention, preferably the nucleotide sequence set forth in the Sequence Listing, or a fragment or an RNA transcript thereof;
35 (b) a nucleotide sequence complementary to that of (a);

(c) a polypeptide of the present invention, preferably the polypeptide set forth in the Sequence Listing or a fragment thereof; or

(d) an antibody to a polypeptide of the present invention, preferably to the polypeptide set forth in the Sequence Listing .

5 It will be appreciated that in any such kit, (a), (b), (c) or (d) may comprise a substantial component. Such a kit will be of use in diagnosing a disease or susceptibility to a disease, particularly diseases of the invention, amongst others.

 The polynucleotide sequences of the present invention are valuable for chromosome localisation studies. The sequences set forth in the Sequence Listing are specifically targeted to, and can hybridize with, a particular location on an individual human chromosome. The mapping of relevant sequences to chromosomes according to the present invention is an important first step in correlating those sequences with gene associated disease. Once a sequence has been mapped to a precise chromosomal location, the physical position of the sequence on the chromosome can be correlated with genetic map data. Such data are found in, for example, V. McKusick, Mendelian Inheritance in Man (available on-line through Johns Hopkins University Welch Medical Library). The relationship between genes and diseases that have been mapped to the same chromosomal region are then identified through linkage analysis (co-inheritance of physically adjacent genes). Precise human chromosomal localisations for a genomic sequence (gene fragment etc.) can be determined using Radiation Hybrid (RH) Mapping (Walter, M. Spillett, D., Thomas, P., Weissenbach, J., and Goodfellow, P., (1994) A method for constructing radiation hybrid maps of whole genomes, Nature Genetics 7, 22-28). A number of RH panels are available from Research Genetics (Huntsville, AL, USA) e.g. the GeneBridge4 RH panel (Hum Mol Genet 1996 Mar;5(3):339-46 A radiation hybrid map of the human genome. Gyapay G, Schmitt K, Fizames C, Jones H, Vega-Czarny N, Spillett D, Muselet D, Prud'Homme JF, Dib C, Auffray C, Morissette J, Weissenbach J, Goodfellow PN). To determine the chromosomal location of a gene using this panel, 93 PCRs are performed using primers designed from the gene of interest on RH DNAs. Each of these DNAs contains random human genomic fragments maintained in a hamster background (human / hamster hybrid cell lines). These PCRs result in 93 scores indicating the presence or absence of the PCR product of the gene of interest. These scores are compared with scores created using PCR products from genomic sequences of known location. This comparison is conducted at <http://www.genome.wi.mit.edu/>.

 The polynucleotide sequences of the present invention are also valuable tools for tissue expression studies. Such studies allow the determination of expression patterns of polynucleotides of the present invention which may give an indication as to the expression patterns of the encoded polypeptides in tissues, by detecting the mRNAs that encode them. The techniques used are well

known in the art and include in situ hybridization techniques to clones arrayed on a grid, such as cDNA microarray hybridization (Schena *et al*, Science, 270, 467-470, 1995 and Shalon *et al*, Genome Res, 6, 639-645, 1996) and nucleotide amplification techniques such as PCR. A preferred method uses the TAQMAN (Trade mark) technology available from Perkin Elmer. Results from these studies can provide an indication of the normal function of the polypeptide in the organism. In addition, comparative studies of the normal expression pattern of mRNAs with that of mRNAs encoded by an alternative form of the same gene (for example, one having an alteration in polypeptide coding potential or a regulatory mutation) can provide valuable insights into the role of the polypeptides of the present invention, or that of inappropriate expression thereof in disease. Such inappropriate expression may be of a temporal, spatial or simply quantitative nature.

A further aspect of the present invention relates to antibodies. The polypeptides of the invention or their fragments, or cells expressing them, can be used as immunogens to produce antibodies that are immunospecific for polypeptides of the present invention. The term "immunospecific" means that the antibodies have substantially greater affinity for the polypeptides of the invention than their affinity for other related polypeptides in the prior art.

Antibodies generated against polypeptides of the present invention may be obtained by administering the polypeptides or epitope-bearing fragments, or cells to an animal, preferably a non-human animal, using routine protocols. For preparation of monoclonal antibodies, any technique which provides antibodies produced by continuous cell line cultures can be used.

Examples include the hybridoma technique (Kohler, G. and Milstein, C., Nature (1975) 256:495-497), the trioma technique, the human B-cell hybridoma technique (Kozbor *et al*, Immunology Today (1983) 4:72) and the EBV-hybridoma technique (Cole *et al*, Monoclonal Antibodies and Cancer Therapy, 77-96, Alan R. Liss, Inc., 1985).

Techniques for the production of single chain antibodies, such as those described in U.S. Patent No. 4,946,778, can also be adapted to produce single chain antibodies to polypeptides of this invention. Also, transgenic mice, or other organisms, including other mammals, may be used to express humanized antibodies.

The above-described antibodies may be employed to isolate or to identify clones expressing the polypeptide or to purify the polypeptides by affinity chromatography. Antibodies against polypeptides of the present invention may also be employed to treat diseases of the invention, amongst others.

Polypeptides and polynucleotides of the present invention may also be used as vaccines. Accordingly, in a further aspect, the present invention relates to a method for inducing an immunological response in a mammal that comprises inoculating the mammal with a polypeptide of the present invention, adequate to produce antibody and/or T cell immune response, including,

for example, cytokine-producing T cells or cytotoxic T cells, to protect said animal from disease, whether that disease is already established within the individual or not. An immunological response in a mammal may also be induced by a method comprises delivering a polypeptide of the present invention *via* a vector directing expression of the polynucleotide and coding for the polypeptide *in vivo* in order to induce such an immunological response to produce antibody to protect said animal from diseases of the invention. One way of administering the vector is by accelerating it into the desired cells as a coating on particles or otherwise. Such nucleic acid vector may comprise DNA, RNA, a modified nucleic acid, or a DNA/RNA hybrid. For use as a vaccine, a polypeptide or a nucleic acid vector will be normally provided as a vaccine formulation (composition). The formulation may further comprise a suitable carrier. Since a polypeptide may be broken down in the stomach, it is preferably administered parenterally (for instance, subcutaneous, intra-muscular, intravenous, or intra-dermal injection). Formulations suitable for parenteral administration include aqueous and non-aqueous sterile injection solutions that may contain anti-oxidants, buffers, bacteriostats and solutes that render the formulation isotonic with the blood of the recipient; and aqueous and non-aqueous sterile suspensions that may include suspending agents or thickening agents. The formulations may be presented in unit-dose or multi-dose containers, for example, sealed ampoules and vials and may be stored in a freeze-dried condition requiring only the addition of the sterile liquid carrier immediately prior to use. The vaccine formulation may also include adjuvant systems for enhancing the immunogenicity of the formulation, such as oil-in water systems and other systems known in the art. The dosage will depend on the specific activity of the vaccine and can be readily determined by routine experimentation.

Polypeptides of the present invention have one or more biological functions that are of relevance in one or more disease states, in particular the diseases of the invention hereinbefore mentioned. It is therefore useful to identify compounds that stimulate or inhibit the function or level of the polypeptide. Accordingly, in a further aspect, the present invention provides for a method of screening compounds to identify those that stimulate or inhibit the function or level of the polypeptide. Such methods identify agonists or antagonists that may be employed for therapeutic and prophylactic purposes for such diseases of the invention as hereinbefore mentioned. Compounds may be identified from a variety of sources, for example, cells, cell-free preparations, chemical libraries, collections of chemical compounds, and natural product mixtures. Such agonists or antagonists so-identified may be natural or modified substrates, ligands, receptors, enzymes, etc., as the case may be, of the polypeptide; a structural or functional mimetic thereof (see Coligan *et al.*, Current Protocols in Immunology 1(2):Chapter 5 (1991)) or a small molecule. Such small molecules preferably have a molecular weight below 2,000 daltons, more

preferably between 300 and 1,000 daltons, and most preferably between 400 and 700 daltons. It is preferred that these small molecules are organic molecules.

The screening method may simply measure the binding of a candidate compound to the polypeptide, or to cells or membranes bearing the polypeptide, or a fusion protein thereof, by means of a label directly or indirectly associated with the candidate compound. Alternatively, the screening method may involve measuring or detecting (qualitatively or quantitatively) the competitive binding of a candidate compound to the polypeptide against a labeled competitor (*e.g.* agonist or antagonist). Further, these screening methods may test whether the candidate compound results in a signal generated by activation or inhibition of the polypeptide, using detection systems appropriate to the cells bearing the polypeptide. Inhibitors of activation are generally assayed in the presence of a known agonist and the effect on activation by the agonist by the presence of the candidate compound is observed. Further, the screening methods may simply comprise the steps of mixing a candidate compound with a solution containing a polypeptide of the present invention, to form a mixture, measuring an activity of the genes set forth in Table I in the mixture, and comparing activity of the mixture of the genes set forth in Table I to a control mixture which contains no candidate compound.

Polypeptides of the present invention may be employed in conventional low capacity screening methods and also in high-throughput screening (HTS) formats. Such HTS formats include not only the well-established use of 96- and, more recently, 384-well micotiter plates but also emerging methods such as the nanowell method described by Schullek *et al*, *Anal Biochem.*, 246, 20-29, (1997).

Fusion proteins, such as those made from Fc portion and polypeptide of the genes set forth in Table I, as hereinbefore described, can also be used for high-throughput screening assays to identify antagonists for the polypeptide of the present invention (see D. Bennett *et al.*, *J Mol Recognition*, 8:52-58 (1995); and K. Johanson *et al.*, *J Biol Chem*, 270(16):9459-9471 (1995)).

The polynucleotides, polypeptides and antibodies to the polypeptide of the present invention may also be used to configure screening methods for detecting the effect of added compounds on the production of mRNA and polypeptide in cells. For example, an ELISA assay may be constructed for measuring secreted or cell associated levels of polypeptide using monoclonal and polyclonal antibodies by standard methods known in the art. This can be used to discover agents that may inhibit or enhance the production of polypeptide (also called antagonist or agonist, respectively) from suitably manipulated cells or tissues.

A polypeptide of the present invention may be used to identify membrane bound or soluble receptors, if any, through standard receptor binding techniques known in the art. These include, but are not limited to, ligand binding and crosslinking assays in which the polypeptide is

labeled with a radioactive isotope (for instance, ^{125}I), chemically modified (for instance, biotinylated), or fused to a peptide sequence suitable for detection or purification, and incubated with a source of the putative receptor (cells, cell membranes, cell supernatants, tissue extracts, bodily fluids). Other methods include biophysical techniques such as surface plasmon resonance and spectroscopy. These screening methods may also be used to identify agonists and antagonists of the polypeptide that compete with the binding of the polypeptide to its receptors, if any. Standard methods for conducting such assays are well understood in the art.

Examples of antagonists of polypeptides of the present invention include antibodies or, in some cases, oligonucleotides or proteins that are closely related to the ligands, substrates, receptors, enzymes, etc., as the case may be, of the polypeptide, *e.g.*, a fragment of the ligands, substrates, receptors, enzymes, etc.; or a small molecule that bind to the polypeptide of the present invention but do not elicit a response, so that the activity of the polypeptide is prevented.

Screening methods may also involve the use of transgenic technology and the genes set forth in Table I. The art of constructing transgenic animals is well established. For example, the genes set forth in Table I may be introduced through microinjection into the male pronucleus of fertilized oocytes, retroviral transfer into pre- or post-implantation embryos, or injection of genetically modified, such as by electroporation, embryonic stem cells into host blastocysts. Particularly useful transgenic animals are so-called "knock-in" animals in which an animal gene is replaced by the human equivalent within the genome of that animal. Knock-in transgenic animals are useful in the drug discovery process, for target validation, where the compound is specific for the human target. Other useful transgenic animals are so-called "knock-out" animals in which the expression of the animal ortholog of a polypeptide of the present invention and encoded by an endogenous DNA sequence in a cell is partially or completely annulled. The gene knock-out may be targeted to specific cells or tissues, may occur only in certain cells or tissues as a consequence of the limitations of the technology, or may occur in all, or substantially all, cells in the animal. Transgenic animal technology also offers a whole animal expression-cloning system in which introduced genes are expressed to give large amounts of polypeptides of the present invention

Screening kits for use in the above described methods form a further aspect of the present invention. Such screening kits comprise:

- (a) a polypeptide of the present invention;
- (b) a recombinant cell expressing a polypeptide of the present invention;
- (c) a cell membrane expressing a polypeptide of the present invention; or
- (d) an antibody to a polypeptide of the present invention;

which polypeptide is preferably that set forth in the Sequence Listing.

It will be appreciated that in any such kit, (a), (b), (c) or (d) may comprise a substantial component.

Glossary

5 The following definitions are provided to facilitate understanding of certain terms used frequently hereinbefore.

"Antibodies" as used herein includes polyclonal and monoclonal antibodies, chimeric, single chain, and humanized antibodies, as well as Fab fragments, including the products of an Fab or other immunoglobulin expression library.

10 "Isolated" means altered "by the hand of man" from its natural state, *i.e.*, if it occurs in nature, it has been changed or removed from its original environment, or both. For example, a polynucleotide or a polypeptide naturally present in a living organism is not "isolated," but the same polynucleotide or polypeptide separated from the coexisting materials of its natural state is "isolated", as the term is employed herein. Moreover, a polynucleotide or polypeptide that is
15 introduced into an organism by transformation, genetic manipulation or by any other recombinant method is "isolated" even if it is still present in said organism, which organism may be living or non-living.

"Secreted protein activity or secreted polypeptide activity" or "biological activity of the secreted protein or secreted polypeptide" refers to the metabolic or physiologic function of said
20 secreted protein including similar activities or improved activities or these activities with decreased undesirable side-effects. Also included are antigenic and immunogenic activities of said secreted protein.

"Secreted protein gene" refers to a polynucleotide comprising any of the attached nucleotide sequences or allelic variants thereof and/or their complements.

25 "Polynucleotide" generally refers to any polyribonucleotide (RNA) or polydeoxribonucleotide (DNA), which may be unmodified or modified RNA or DNA.

"Polynucleotides" include, without limitation, single- and double-stranded DNA, DNA that is a mixture of single- and double-stranded regions, single- and double-stranded RNA, and RNA that is mixture of single- and double-stranded regions, hybrid molecules comprising DNA and RNA that
30 may be single-stranded or, more typically, double-stranded or a mixture of single- and double-stranded regions. In addition, "polynucleotide" refers to triple-stranded regions comprising RNA or DNA or both RNA and DNA. The term "polynucleotide" also includes DNAs or RNAs containing one or more modified bases and DNAs or RNAs with backbones modified for stability or for other reasons. "Modified" bases include, for example, tritylated bases and unusual bases
35 such as inosine. A variety of modifications may be made to DNA and RNA; thus,

"polynucleotide" embraces chemically, enzymatically or metabolically modified forms of polynucleotides as typically found in nature, as well as the chemical forms of DNA and RNA characteristic of viruses and cells. "Polynucleotide" also embraces relatively short polynucleotides, often referred to as oligonucleotides.

5 "Polypeptide" refers to any polypeptide comprising two or more amino acids joined to each other by peptide bonds or modified peptide bonds, i.e., peptide isosteres. "Polypeptide" refers to both short chains, commonly referred to as peptides, oligopeptides or oligomers, and to longer chains, generally referred to as proteins. Polypeptides may contain amino acids other than the 20 gene-encoded amino acids. "Polypeptides" include amino acid sequences modified either
10 by natural processes, such as post-translational processing, or by chemical modification techniques that are well known in the art. Such modifications are well described in basic texts and in more detailed monographs, as well as in a voluminous research literature. Modifications may occur anywhere in a polypeptide, including the peptide backbone, the amino acid side-chains and the amino or carboxyl termini. It will be appreciated that the same type of modification may be
15 present to the same or varying degrees at several sites in a given polypeptide. Also, a given polypeptide may contain many types of modifications. Polypeptides may be branched as a result of ubiquitination, and they may be cyclic, with or without branching. Cyclic, branched and branched cyclic polypeptides may result from post-translation natural processes or may be made by synthetic methods. Modifications include acetylation, acylation, ADP-ribosylation, amidation,
20 biotinylation, covalent attachment of flavin, covalent attachment of a heme moiety, covalent attachment of a nucleotide or nucleotide derivative, covalent attachment of a lipid or lipid derivative, covalent attachment of phosphatidylinositol, cross-linking, cyclization, disulfide bond formation, demethylation, formation of covalent cross-links, formation of cystine, formation of pyroglutamate, formylation, gamma-carboxylation, glycosylation, GPI anchor formation,
25 hydroxylation, iodination, methylation, myristoylation, oxidation, proteolytic processing, phosphorylation, prenylation, racemization, selenoylation, sulfation, transfer-RNA mediated addition of amino acids to proteins such as arginylation, and ubiquitination (see, for instance, *Proteins - Structure and Molecular Properties*, 2nd Ed., T. E. Creighton, W. H. Freeman and Company, New York, 1993; Wold, F., *Post-translational Protein Modifications: Perspectives and Prospects*, 1-12, in *Post-translational Covalent Modification of Proteins*, B. C. Johnson, Ed.,
30 Academic Press, New York, 1983; Seifter *et al.*, "Analysis for protein modifications and nonprotein cofactors", *Meth Enzymol*, 182, 626-646, 1990, and Rattan *et al.*, "Protein Synthesis: Post-translational Modifications and Aging", *Ann NY Acad Sci*, 663, 48-62, 1992).

"Fragment" of a polypeptide sequence refers to a polypeptide sequence that is shorter than
35 the reference sequence but that retains essentially the same biological function or activity as the

reference polypeptide. "Fragment" of a polynucleotide sequence refers to a polynucleotide sequence that is shorter than the reference sequence set forth in the Sequence Listing.

"Variant" refers to a polynucleotide or polypeptide that differs from a reference polynucleotide or polypeptide, but retains the essential properties thereof. A typical variant of a polynucleotide differs in nucleotide sequence from the reference polynucleotide. Changes in the nucleotide sequence of the variant may or may not alter the amino acid sequence of a polypeptide encoded by the reference polynucleotide. Nucleotide changes may result in amino acid substitutions, additions, deletions, fusions and truncations in the polypeptide encoded by the reference sequence, as discussed below. A typical variant of a polypeptide differs in amino acid sequence from the reference polypeptide. Generally, alterations are limited so that the sequences of the reference polypeptide and the variant are closely similar overall and, in many regions, identical. A variant and reference polypeptide may differ in amino acid sequence by one or more substitutions, insertions, deletions in any combination. A substituted or inserted amino acid residue may or may not be one encoded by the genetic code. Typical conservative substitutions include Gly, Ala; Val, Ile, Leu; Asp, Glu; Asn, Gln; Ser, Thr; Lys, Arg; and Phe and Tyr. A variant of a polynucleotide or polypeptide may be naturally occurring such as an allele, or it may be a variant that is not known to occur naturally. Non-naturally occurring variants of polynucleotides and polypeptides may be made by mutagenesis techniques or by direct synthesis. Also included as variants are polypeptides having one or more post-translational modifications, for instance glycosylation, phosphorylation, methylation, ADP ribosylation and the like. Embodiments include methylation of the N-terminal amino acid, phosphorylations of serines and threonines and modification of C-terminal glycines.

"Allele" refers to one of two or more alternative forms of a gene occurring at a given locus in the genome.

"Polymorphism" refers to a variation in nucleotide sequence (and encoded polypeptide sequence, if relevant) at a given position in the genome within a population.

"Single Nucleotide Polymorphism" (SNP) refers to the occurrence of nucleotide variability at a single nucleotide position in the genome, within a population. An SNP may occur within a gene or within intergenic regions of the genome. SNPs can be assayed using Allele Specific Amplification (ASA). For the process at least 3 primers are required. A common primer is used in reverse complement to the polymorphism being assayed. This common primer can be between 50 and 1500 bps from the polymorphic base. The other two (or more) primers are identical to each other except that the final 3' base wobbles to match one of the two (or more) alleles that make up the polymorphism. Two (or more) PCR reactions are then conducted on sample DNA, each using the common primer and one of the Allele Specific Primers.

"Splice Variant" as used herein refers to cDNA molecules produced from RNA molecules initially transcribed from the same genomic DNA sequence but which have undergone alternative RNA splicing. Alternative RNA splicing occurs when a primary RNA transcript undergoes splicing, generally for the removal of introns, which results in the production of more than one mRNA molecule each of that may encode different amino acid sequences. The term splice variant also refers to the proteins encoded by the above cDNA molecules.

"Identity" reflects a relationship between two or more polypeptide sequences or two or more polynucleotide sequences, determined by comparing the sequences. In general, identity refers to an exact nucleotide to nucleotide or amino acid to amino acid correspondence of the two polynucleotide or two polypeptide sequences, respectively, over the length of the sequences being compared.

"% Identity" - For sequences where there is not an exact correspondence, a "% identity" may be determined. In general, the two sequences to be compared are aligned to give a maximum correlation between the sequences. This may include inserting "gaps" in either one or both sequences, to enhance the degree of alignment. A % identity may be determined over the whole length of each of the sequences being compared (so-called global alignment), that is particularly suitable for sequences of the same or very similar length, or over shorter, defined lengths (so-called local alignment), that is more suitable for sequences of unequal length.

"Similarity" is a further, more sophisticated measure of the relationship between two polypeptide sequences. In general, "similarity" means a comparison between the amino acids of two polypeptide chains, on a residue by residue basis, taking into account not only exact correspondences between a between pairs of residues, one from each of the sequences being compared (as for identity) but also, where there is not an exact correspondence, whether, on an evolutionary basis, one residue is a likely substitute for the other. This likelihood has an associated "score" from which the "% similarity" of the two sequences can then be determined.

Methods for comparing the identity and similarity of two or more sequences are well known in the art. Thus for instance, programs available in the Wisconsin Sequence Analysis Package, version 9.1 (Devereux J et al, Nucleic Acids Res, 12, 387-395, 1984, available from Genetics Computer Group, Madison, Wisconsin, USA), for example the programs BESTFIT and GAP, may be used to determine the % identity between two polynucleotides and the % identity and the % similarity between two polypeptide sequences. BESTFIT uses the "local homology" algorithm of Smith and Waterman (J Mol Biol, 147,195-197, 1981, Advances in Applied Mathematics, 2, 482-489, 1981) and finds the best single region of similarity between two sequences. BESTFIT is more suited to comparing two polynucleotide or two polypeptide sequences that are dissimilar in length, the program assuming that the shorter sequence represents

a portion of the longer. In comparison, GAP aligns two sequences, finding a "maximum similarity", according to the algorithm of Neddleman and Wunsch (J Mol Biol, 48, 443-453, 1970). GAP is more suited to comparing sequences that are approximately the same length and an alignment is expected over the entire length. Preferably, the parameters "Gap Weight" and "Length Weight" used in each program are 50 and 3, for polynucleotide sequences and 12 and 4 for polypeptide sequences, respectively. Preferably, % identities and similarities are determined when the two sequences being compared are optimally aligned.

Other programs for determining identity and/or similarity between sequences are also known in the art, for instance the BLAST family of programs (Altschul S F et al, J Mol Biol, 215, 403-410, 1990, Altschul S F et al, Nucleic Acids Res., 25:389-3402, 1997, available from the National Center for Biotechnology Information (NCBI), Bethesda, Maryland, USA and accessible through the home page of the NCBI at www.ncbi.nlm.nih.gov) and FASTA (Pearson W R, Methods in Enzymology, 183, 63-99, 1990; Pearson W R and Lipman D J, Proc Nat Acad Sci USA, 85, 2444-2448, 1988, available as part of the Wisconsin Sequence Analysis Package).

Preferably, the BLOSUM62 amino acid substitution matrix (Henikoff S and Henikoff J G, Proc. Nat. Acad Sci. USA, 89, 10915-10919, 1992) is used in polypeptide sequence comparisons including where nucleotide sequences are first translated into amino acid sequences before comparison.

Preferably, the program BESTFIT is used to determine the % identity of a query polynucleotide or a polypeptide sequence with respect to a reference polynucleotide or a polypeptide sequence, the query and the reference sequence being optimally aligned and the parameters of the program set at the default value, as hereinbefore described.

"Identity Index" is a measure of sequence relatedness which may be used to compare a candidate sequence (polynucleotide or polypeptide) and a reference sequence. Thus, for instance, a candidate polynucleotide sequence having, for example, an Identity Index of 0.95 compared to a reference polynucleotide sequence is identical to the reference sequence except that the candidate polynucleotide sequence may include on average up to five differences per each 100 nucleotides of the reference sequence. Such differences are selected from the group consisting of at least one nucleotide deletion, substitution, including transition and transversion, or insertion. These differences may occur at the 5' or 3' terminal positions of the reference polynucleotide sequence or anywhere between these terminal positions, interspersed either individually among the nucleotides in the reference sequence or in one or more contiguous groups within the reference sequence. In other words, to obtain a polynucleotide sequence having an Identity Index of 0.95 compared to a reference polynucleotide sequence, an average of up to 5 in every 100 of the nucleotides of the in the reference sequence may be deleted, substituted or inserted, or any combination thereof, as

hereinbefore described. The same applies *mutatis mutandis* for other values of the Identity Index, for instance 0.96, 0.97, 0.98 and 0.99.

Similarly, for a polypeptide, a candidate polypeptide sequence having, for example, an Identity Index of 0.95 compared to a reference polypeptide sequence is identical to the reference sequence except that the polypeptide sequence may include an average of up to five differences per each 100 amino acids of the reference sequence. Such differences are selected from the group consisting of at least one amino acid deletion, substitution, including conservative and non-conservative substitution, or insertion. These differences may occur at the amino- or carboxy-terminal positions of the reference polypeptide sequence or anywhere between these terminal positions, interspersed either individually among the amino acids in the reference sequence or in one or more contiguous groups within the reference sequence. In other words, to obtain a polypeptide sequence having an Identity Index of 0.95 compared to a reference polypeptide sequence, an average of up to 5 in every 100 of the amino acids in the reference sequence may be deleted, substituted or inserted, or any combination thereof, as hereinbefore described. The same applies *mutatis mutandis* for other values of the Identity Index, for instance 0.96, 0.97, 0.98 and 0.99.

The relationship between the number of nucleotide or amino acid differences and the Identity Index may be expressed in the following equation:

$$n_a \leq x_a - (x_a \bullet I),$$

in which:

n_a is the number of nucleotide or amino acid differences,

x_a is the total number of nucleotides or amino acids in a sequence set forth in the Sequence Listing,

I is the Identity Index,

\bullet is the symbol for the multiplication operator, and

in which any non-integer product of x_a and I is rounded down to the nearest integer prior to subtracting it from x_a .

"Homolog" is a generic term used in the art to indicate a polynucleotide or polypeptide sequence possessing a high degree of sequence relatedness to a reference sequence. Such relatedness may be quantified by determining the degree of identity and/or similarity between the two sequences as hereinbefore defined. Falling within this generic term are the terms "ortholog", and "paralog". "Ortholog" refers to a polynucleotide or polypeptide that is the functional equivalent of the polynucleotide or polypeptide in another species. "Paralog" refers to a polynucleotide or polypeptide that within the same species which is functionally similar.

"Fusion protein" refers to a protein encoded by two, often unrelated, fused genes or fragments thereof. In one example, EP-A-0 464 533-A discloses fusion proteins comprising various portions of constant region of immunoglobulin molecules together with another human protein or part thereof. In many cases, employing an immunoglobulin Fc region as a part of a fusion protein is advantageous for use in therapy and diagnosis resulting in, for example, improved pharmacokinetic properties [see, *e.g.*, EP-A 0232 262]. On the other hand, for some uses it would be desirable to be able to delete the Fc part after the fusion protein has been expressed, detected and purified.

All publications and references, including but not limited to patents and patent applications, cited in this specification are herein incorporated by reference in their entirety as if each individual publication or reference were specifically and individually indicated to be incorporated by reference herein as being fully set forth. Any patent application to which this application claims priority is also incorporated by reference herein in its entirety in the manner described above for publications and references.

Table I.

Gene Name	GSK Gene ID	Nucleic Acid SEQ ID NO's	Corresponding Protein SEQ ID NO's
sbgTango79a	14898	SEQ ID NO:1	SEQ ID NO:24
sbgPRO331a	14908	SEQ ID NO:2	SEQ ID NO:25
sbghPYYa	24835	SEQ ID NO:3	SEQ ID NO:26
sbghGTa	25306	SEQ ID NO:4	SEQ ID NO:27
SB-HDGF	42748	SEQ ID NO:5 SEQ ID NO:6	SEQ ID NO:28 SEQ ID NO:29
SBhACRP30a	34718	SEQ ID NO:7 SEQ ID NO:8	SEQ ID NO:30 SEQ ID NO:31
sbg35069DBIa	35069	SEQ ID NO:9	SEQ ID NO:32
sbg14862SPERCTa	14862	SEQ ID NO:10 SEQ ID NO:11	SEQ ID NO:33 SEQ ID NO:34
sbg24878SIa	24878	SEQ ID NO:12 SEQ ID NO:13	SEQ ID NO:35 SEQ ID NO:36
sbg34976IGBa	34976	SEQ ID NO:14	SEQ ID NO:37
sbg41608HDGFa	41608	SEQ ID NO:15	SEQ ID NO:38
sbg66804SPARCra	66804	SEQ ID NO:16 SEQ ID NO:17	SEQ ID NO:39 SEQ ID NO:40
sbg72825FOLATEa	72825	SEQ ID NO:18	SEQ ID NO:41
SBhPRO221	73255	SEQ ID NO:19	SEQ ID NO:42
sbg77153CYSa	77153	SEQ ID NO:20	SEQ ID NO:43
SBh80014.IAPa	80014	SEQ ID NO:21 SEQ ID NO:22	SEQ ID NO:44 SEQ ID NO:45
sbgFGF-19b	68602	SEQ ID NO:23	SEQ ID NO:46

Table II

Gene Name	Gene Family	Closest Polynucleotide by homology	Closest Polypeptide by homology	Cell Localization (by homology)
sbgTango79a	Slit-like membrane glycoprotein	GB:AC004152 Joint Genome Institute, Lawrence Livermore National Laboratory, 7000 East Ave., Livermore, CA 94551, USA	The human Tango-79 protein, geneseqp:W84596 Patent number and publication date: WO9906427-A1 11-Feb- 99	membrane- bound
sbgPRO331a	Slit-like membrane glycoprotein	GB:AC008039 Human Genome Center, University of Washington, Box 352145, Seattle, WA 98195, USA	The human protein PRO331, geneseqp:Y13394 Patent number and publication date: WO9914328-A2 25-Mar- 99	membrane- bound
sbghPYYa	Peptide YY	GB:AJ239323	Human peptideYY,	secreted

		Max-Planck-Institute for Molecular Genetics	gi:1172796 Kohri,K., Nata,K., Yonekura,H., Nagai, A., Konno,K. and Okamoto,H. Biochim. Biophys. Acta 1173 (3), 345-349 (1993)	
sbghGTa	Gonadotropin beta chain	GB:AL049871 Genoscope – Centre National de Sequencage :BP 19191006 EVRY cedex FRANCE	Pacific herring gonadotropin II-beta,gi:4200297 Power,M.E., Carolsfield,J, Wallis, G.P. and Sherwood, N.M. J. Fish Biol. 50, 315-323 (1997)	secreted
SB-HDGF	Hepatoma derived growth factor (HDGF)	JGI:CIT978SKB_50L17 Found at Joint Genome Institute	Mouse HDGF, gi: 2558501 Biochem. Biophys. Res. Commun. 238(1), 26-32, 1997	secreted
SBhACRP3 0a	Complement C1q/TNF	GB:AC007016 Submitted (08-May-99) by Department of Genetics, Stanford Human Genome Center, 855 Miranda Avenue, Palo, CA 94304	Mouse30 Kda adipocyte complement-related protein ACRP30, gi: 1051268 P. Sherer et al., J.Biol. Chem. 270(18), 10697-10703, 1996.	secreted
sbg35069D BIa	Neuropeptide	EMBL:AC010999 Submitted (29-Sep-1999) by Multimegabase Sequencing Center, University of Washington, P.O. Box 357730. Seattle, WA 98195	ACYL-COA-BINDING PROTEIN HOMOLOG (ACBP), gi:1168274 Lihmann, I. et al. Proc. Natl. Acad. Sci. U.S.A. 91 (15), 6899-6903 (1994)	cytosolic
sbg14862S PERCTa	speract receptor	GB:AC005522 (WU:H_DJ1129E2) submitted by Genome Sequencing Center, Washington University, School of Medicine, 4444 Forest Park Parkway, St. Lous, MO 63108, USA	gp-340, a putative opsonin receptor for lung surfactant, gi:5733598 Holmskov U, Mollenhauer J, Madsen J, Vitved L, Gronlund J, Tornoe I, Kliem A, Reid KB, Poustka A, Skjodt K, Proc Natl Acad Sci U S A 1999 Sep 14; 96(19):10794-9.	membrane-bound
sbg24878SI a	laminin type EGF, EGF2, ldla2, dlra2, ldla1 and EGF1	SC:AL109804 found at Sanger Center	Mouse sialoadhesin gene, gi:2769747 Mucklow S, Gordon S, Crocker PR. Mamm Genome 1997 Dec;8(12):934-7	secreted
sbg34976I GBa	Slit-like membrane glycoprotein	GB:AC010931 Submitted (30-JAN-1999) by Genome Sequencing Center, Washington University	Immunoglobulin superfamily containing leucine-rich repeat, gi:5031809 Nagasawa A, Kubota R,	membrane-bound

		School of Medicine, 4444 Forest Park Parkway, St. Louis, MO 63108, USA	Imamura Y, Nagamine K, Wang Y, Asakawa S, Kudoh J, Minoshima S, Mashima Y, Oguchi Y, Shimizu N, Genomics 1997 Sep 15;44(3):273-9	
sbg41608H DGFa	Hepatoma- derived growth factor	GB:AL033539 Submitted by Sanger Center Hinxton, Cambridgeshire, CB10 1SA, UK	Bovine hepatoma-derived growth factor, gi:945419 Biochem. Biophys. Res. Commun. 238(1):26-32, 1997	secreted
sbg66804S PARCra	Sparc-related protein	GB:AL135747 Submitted by Genoscope - Centre National de Sequencage :BP 19191006 EVRY cedex, FRANCE	Mouse SPARC-related rprotein, gi:5305327 Submitted (05-Jun-1998) by GeneCraft, Treskowst. 10, Muenster 48163, Germany.	membrane- bound
sbg72825F OLATEa	Folate receptor	SB:AP000765 Submitted (25-NOV- 1999) by Masahira Hattori, The Institute of Physical and Chemical Research (RIKEN), Genomic Sciences Center (GSC); 1-7-22 Suehiro-chou, Tsurumi-ku, Yokohama, Kanagawa 230-0045, Japan	Sus scrofa membrane- bound folate binding protein, gi:4928859 Vallet, J.L., Smith, T.P.L., Sontegard, T., Pearson, P.L., Christenson, R.K. and Klemcke, H.G. Biol. Reprod. 61(2):372 (1999)	membrane- bound
SBhPRO221	Slit-like membrane glycoprotein	GB:AP001065 Submitted (12-JAN- 2000) by Nobuyoshi Shimizu, Keio University, School of Medicine, Molecular Biology; 35 Shinanomachi, Shinjuku- ku, Tokyo 160-8582, Japan	New isolated human gene, geneseqp:Y13356. WO9914328-A2, Chen, J. Goddard, A., Yuan, J., Genentech Inc. 25th June 1999 GPS	membrane- bound
sbg77153C YSa	Testatin	GB:AL121894 Submitted by Sanger Center	Mouse testatin precursor, gi:3928491 Tohonen, V., Osterlund, C. and Nordqvist, K. Proc. Natl. Acad. Sci. U.S.A. 95 (24), 14208-14213 (1998).	secreted
SBh80014.I APa	Inhibitor of apoptosis protein (IAP)	GB:AL121827 Submitted by Sanger Center	human putative inhibitor of apoptosis, gi: 3914339 C. Stehlik et al, Biochem. Biophys. Res. Commun. 243(3), 827-832, 1998	cytosolic

sbgFGF-19b	Fibroblast Growth Factor	GB:AB018122Homo sapiens mRNA for FGF-19, complete cds (Nishimura,T., Utsunomiya,Y., Hoshikawa,M., Ohuchi,H. and Itoh,N. Structure and expression of a novel human FGF, FGF-19, expressed in the fetal brain. Biochim. Biophys. Acta 1444 (1), 148-151 (1999))	FGF-19 (gi 5668601, gi 4826726, gi4514718, (Nishimura,T., Utsunomiya,Y., Hoshikawa,M., Ohuchi,H. and Itoh,N. Structure and expression of a novel human FGF, FGF-19, expressed in the fetal brain. Biochim. Biophys. Acta 1444 (1), 148-151 (1999))	secreted
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Table III.

Gene Name	Uses	Associated Diseases
sbgTango79a	An embodiment of the invention is the use of sbgTango79a, a secreted protein, in the diagnosis and treatment of Tango-associated diseases and involvement in gastrointestinal ulceration. Close Homologs of sbgTango79a are Tango 79 and PRO227.	Alzheimers disease, ALS, abnormal keratinocyte differentiation, anti thrombosis, atrophia areata, cell growth, congenital microvillus atrophy, dermal scarring, enterocolitis, cancer, gastrointestinal ulceration, neuropathy, Parkinson's disease, psoriasis, skin diseases, Usher's syndrome, wound healing, and Zollinger-Ellison syndrome
sbgPRO331a	An embodiment of the invention is the use of sbgPRO331a, in the treatment of gastrointestinal ulceration and involved in nutritional activity, cytokine and cell proliferation/differentiation activity, immune stimulating (e.g. as vaccines) or suppressing activity, haematopoiesis regulating activity, tissue growth activity, activin/inhibin activity, chemotactic/chemokinetic activity, haemostatic and thrombolytic activity, receptor/ligand activity, anti-inflammatory activity, cadherin/tumour invasion suppressor activity, and tumour inhibition activity. The polynucleotides of sbgPRO331a may also be useful for gene therapy. Close Homologs of sbgPRO331a are PRO331 and AS209_1.	Alzheimers disease, ALS, abnormal keratinocyte differentiation, anti-thrombosis, atrophia areata, cell growth, hematopoietic disease, diseases of the immune system, inflammation, congenital microvillus atrophy, dermal scarring, enterocolitis, cancer, gastrointestinal ulceration, neuropathy, Parkinson's disease, psoriasis, skin diseases, Usher's syndrome, wound healing, and Zollinger-Ellison syndrome
sbghPYYa	An embodiment of the invention is the use of sbghPYYa, to identify new receptors and receptor agonists, antagonists, or protein agents. A close homolog of sbghPYYa is Peptide YY precursor, a clinically significant member of the neuropeptide family which include peptides such as pancreatic hormone, neuropeptide Y (NPY) and peptide YY (PYY). These neuropeptides are ligands for G-protein coupled receptors.	Anxiety, schizophrenia, feeding disorders, anorexia, depression, grooming, stretching, yawning, social, sexual and rewarded behavior, chronic and acute inflammation, cardiovascular disease, sleep disorder, learning and memory alteration and altered immune response, cancer, seizure, stroke, migraine, asthma, neuropathy and aging
sbghGTa	Human gonadotropin most similar to luteinizing hormone, sbghGTa, is exploitable in similar ways to luteinizing hormone or its releasing hormone. Luteinizing hormone is helpful in ovulation induction for reproductive procedures (Fertil. Steril.	Sexual disorders, infertility, blocking fertility, hypogonadism, prostate and other cancers, treatment of transsexuals

	1999. 71(3):405-414). Luteinizing hormone-releasing hormone and its agonists are exploited to reduce androgen levels in prostate cancer (Oncology. 1998. 12(4):499-505). Gonadotropin releasing hormone use is helpful in polycystic ovary syndrome (Eur. J. Contracept. Reprod. Health Care. 1997. 2(4):213-224).	
SB-HDGF	An embodiment of the invention is the use of SB-HDGF, to control cell growth and regulation of cell differentiation. Hepatoma-derived growth factors are members of a diverse family of cytokines. Like other cytokines, they are peptides involved in the control of cell growth regulation, differentiation and function (Thomson, The Cytokine Handbook, 2nd edition, Academic Press, Harcourt Brace & co. publishers, London). Another embodiment of the invention is the use of SB-HDGF for diagnosis or therapeutic treatment of human hepatoma. HDGFs are structurally related to Fibroblast growth factors (Klagsbrun M., Sasse, J., Proc. Natl. Acad. Sci. USA 1986 83(8) 2448-52). This putative growth factor may play an important role in autonomous growth of hepatoma and may lead to useful diagnosis or therapeutic approaches to Human Hepatoma (Nakamura, H., Kambe, H., Egawa, T Clin Chim Acta 1989, 183(3):273-84). A further embodiment of the invention is the use of SB-HDGF to prevent tumor growth. Inhibition of fibroblast growth factor-2 by the compound Suramin prevents neovascularisation and tumor growth in mice (Pesenti et al., British Journal of Cancer, 66:367-372.)	Cancer, inflammation, defective immune response, cardiovascular disease, growth abnormalities
SBhACRP30 a	Based on EST expression data, SBHACRP30a is primarily or exclusively expressed in heart. Based on the similarity of SBHACRP30a to ACRP30, Hib27, C1q complement proteins, TNF, and other members of the TNF superfamily, an embodiment of the invention is the use that the encoded protein of SBhACRP30a may play a role in inflammation, cell proliferation, cell death, immunity, and/or energy homeostasis processes. SBHACRP30a show highest similarity to one member of this superfamily, ACRP30 (Adipocyte Complement-Related Protein of 30 kDa). ACRP30 is made exclusively in adipocytes, and its expression is dysregulated in various forms of obesity (Hu, E, Liang, P and Spiegelman, BM. J. Biol. Chem 271, 10697-10703, 1996). ACRP30 secretion is acutely stimulated by insulin (Scherer, PE, Williams S., Fogliano, M., Baldini, G. and Lodish, J Biol. Chem. 270, 26746-26749, 1995) and is repressed by chronically elevated levels of insulin. A related molecule, the Hib27 protein from Siberian chipmunks, seems also to be involved in energy homeostasis, as its expression is specifically extinguished during hibernation (Takamatsu, N., Ohba, K., Kondo, J., Kondo, N., and Shiba, T. Mol. Cell Biol. 13 1516-1521, 1993). Recently, it has been shown that the three dimensional structure of ACRP30 is superimposable with that of the TNF's, suggesting	Cancer, obesity, anorexia, inflammation, cardiovascular disease, growth abnormalities

	that these proteins may have a similar function and mode of action (Shapiro, L and Scherer PE., Current Biology 8, 335-338, 1997). TNF's are known to play a role in energy homeostasis, where they are implicated in cachexia, obesity and in insulin resistance (Hotamisligil GS., and Spiegelman BM. Diabetes (1994) 43, 1271-1278; Teoman Uysal K., Wiesbrock SM, Marina MW and Hotamisligil GS, Nature 389, 610-614, 1997).	
sbg35069DBI a	An embodiment of the invention is the use of sbg35069DBIa to function as a neuropeptide, modulating the activity of the GABA receptor. A similar homologue can displace diazepam from benzodiazepine (BZD) recognition site on GABA type A receptors. As such, it may function as a neuropeptide, modulating the activity of the GABA receptor (J.B.C. 1986. 261(21):9727-31). Two forms, short and long (Biochem. J. 1995. 306:327-30), are predicted to be intracellular and secreted, respectively.	Anxiety, schizophrenia, feeding disorders, anorexia, depression, grooming, stretching, yawning, social, sexual and rewarded behavior, chronic and acute inflammation, cardiovascular disease, sleep disorder, learning and memory alteration and altered immune response, cancer, seizure, stroke, migraine, asthma, neuropathy and aging
sbg14862SPERCTa	An embodiment of the invention is the use of sbg14862SPERCTa, a secreted protein, in the diagnosis and treatment of cancers. A close homolog of sbg14862SPERCTa is human secreted protein SRCR.	Cancer, infections, autoimmune diseases, wound healing and hematopoietic disorder
sbg24878SIa	An embodiment of the invention is the use that the encoded protein of sbg24878SIa, a member of the immunoglobulin superfamily, may play a roll in cell-cell interactions. The closest homologue to this protein is the mouse sialoadhesin genes, a macrophage sialic acid binding receptor for haemopoietic cells with 17 immunoglobulin-like domains, is proposed to function in both secreted and membrane-bound forms and involved in cell-cell interactions. A further embodiment of the invention is the use of sbg24878SIa to inhibit T-cell-B-cell interactions for treating auto-immune disease such as rheumatoid arthritis, systemic lupus erythematosus etc. Close Homologs of sbg24878SIa are mouse sialoadhesin genes and CD22 beta.	Auto-immune diseases such as rheumatoid arthritis, systemic lupus erythematosus and tumors
sbg34976IGBa a	An embodiment of the invention is the use of sbg34976IGBa, a secreted protein, in the diagnosis and treatment of Bardet-Biedl syndrome type 4 (BBS4). A close homolog of sbg34976IGBa is leucine rich repeat (ISLR) mRNA.	Alzheimers disease, ALS, abnormal keratinocyte differentiation, anti-thrombosis, atrophia areata, cell growth, hematopoietic disease, diseases of the immune system, inflammation, congenital microvillus atrophy, dermal scarring, enterocolitis, cancer, gastrointestinal ulceration, neuropathy, Parkinson's disease, psoriasis, skin diseases, Usher's syndrome, wound healing, and Zollinger-Ellison syndrome
sbg41608HDGFa	An embodiment of the invention is the use of sbg41608HDGFa, to control cell growth and regulation of cell differentiation. Hepatoma-derived growth factors are members of a diverse family of cytokines. Like other cytokines, they are peptides involved in the control of cell growth, regulation,	Cancer, inflammation, defective immune response, cardiovascular disease, growth abnormalities

	<p>differentiation and function (e.g. Thomson, The Cytokine Handbook, 2nd edition, Academic Press, Harcourt Brace & co. publishers, London). Another embodiment of the invention is the use of sbg41608HDGFa for diagnosis or therapeutic treatment of human hepatoma. HDGF are structurally related to Fibroblast growth factors (Klagsbrun M., Sasse, J., Proc. Natl.Acad. Sci. USA 1986 83(8) 2448-52). This putative growth factor may play an important role in autonomous growth of hepatoma and may lead to useful diagnosis or therapeutic approaches to Human Hepatoma (Nakamura, H., Kambe, H., Egawa, T Clin Chim Acta 1989, 183(3):273-84,). A further embodiment of the invention is the use of sbg41608HDGFa to prevent tumor growth. Inhibition of fibroblast growth factor-2 by the compound Suramin prevents neovascularisation and tumor growth in mice (Pesenti et al., British Journal of Cancer, 66:367-372)</p>	
sbg66804SPARCra	<p>An embodiment of the invention is the use of sbg66804SPARCra, in development, remodeling, cell turnover, tissue repair, and tumor growth. The closest homologue to this secreted protein is the mouse SPARC-related protein. SPARC (Secreted Protein, Acidic and Rich in Cysteine) is a unique extracellular glycoprotein that is expressed by many different types of cells and is associated with development, remodeling, cell turnover, and tissue repair. Its principal functions in vitro are counteradhesion and antiproliferation, which proceed via different signaling pathways. SPARC has demonstrated activities in angiogenesis, cataractogenesis, and wound healing. SPARC has also been identified in tumors.</p>	Cataractogenesis, angiogenesis, wound healing, tumors
sbg72825FOLATEa	<p>An embodiment of the invention is the use of sbg72825FOLATEa in the diagnostic and treatment applications of malignant, such as epithelial cancers, ovary, uterus, cervix cancer and future cancer vaccine developments. A close homolog of sbg72825FOLATEa is membrane bound folate binding protein.</p>	Epithelial cancers, ovary, uterus and cervix cancer
SBhPRO221	<p>An embodiment of the invention is the use of SBhPRO221 in disorders associated with preservation and maintenance of gastric mucosa, treatment of chronic and acute gastric ulcer, skin disease like epithelial cancer, lung squamous carcinoma, neuropathy, Parkinson disease, Alzheimer disease, tissue repair, problems of kidney, endometrium, blood vessels and other tissue in genital tract.</p>	Disorders associated with healthy maintenance of gastric mucosa and repair of acute and chronic mucosal lesion, skin disease, lung carcinoma, growth abnormalities, Parkinson, Alzheimer's disease, ALS, neuropathy and cancer
sbg77153CYSa	<p>An embodiment of the invention is the use of sbg77153CYSa in natural tissue remodeling events such as bone resorption and embryo implantation along with associations with tumor formation and metastasis. The closest homologue is the mouse testatin precursor (Cystatin 9), is related to a group of genes that encodes cysteine protease inhibitors known as cystatins. Cystatins and their target</p>	Tumors and metastasis, remodeling bone resorption and embryo implantation

	proteases have been associated with tumor formation and metastasis, but also are involved in natural tissue remodeling events such as bone resorption and embryo implantation.	
SBh80014.IA Pa	An embodiment of the invention is the use of SBh80014.IAPa in inhibition of apoptosis and thus in, cell proliferation, cancer, metastasis, cell death, immunity, and energy homeostatis processes. A close homolog to SBh80014.IAPa is PIAP (putative inhibitor of apoptosis protein) (C. Stehlik et al, Biochem. Biophys. Res. Commun. 243(3), 827-832, 1998). PIAP is made primarily in tumor cells and is strongly upregulated in response to inflammatory cytokine TNF- α , IL-1 and lipopolysaccharides. The members of this family are conserved across species.	Suppression of apoptosis, cell proliferation, cancer, metastasis, Inflammation, defective immune response, growth abnormalities
sbgFGF-19b	An embodiment of the invention is the use of sbgFGF-19b in cell growth, regulation, differentiation, function, angiogenesis, neovascularisation, wound healing, astrogliosis, glial cell proliferation and differentiation, cerebral vasodilation, neurotrophic/neuromodulatory processes, improves the outcome in cerebral ischemia, promotes neoangiogenesis in ischemic myocardium, and enhances functional recovery and/or promotes neuronal sprouting following focal cerebral infarct. Fibroblast growth factors are a diverse family of cytokines. Like other cytokines, they are peptides involved in the control of cell growth, regulation, differentiation and function (e.g. Thomson, The Cytokine Handbook, 2nd edition, Academic Press, Harcourt Brace & co. publishers, London). Fibroblast growth factors are so called because they are fibroblast mitogens (Gospodarawicz, Journal of Biological Chemistry, (1975) 250: 2515-2520). Inhibition of fibroblast growth factor-2 by the compound Suramin prevents neovascularisation and tumor growth in mice (Pesenti et al., British Journal of Cancer, 66:367-372). Fibroblast growth factors also function in angiogenesis (Lyons, M.K., et al., Brain Res. (1991) 558:315-320), wound healing (Uhl, E., et al., Br. J. Surg. (1993) 80:977-980, 1993), astrogliosis, glial cell proliferation and differentiation (Biagini, G. et al., Neurochem. Int. (1994) 25:17-24), cerebral vasodilation (Tanaka, R. et al., Stroke (1995) 26:2154-2159), and neurotrophic/neuromodulatory processes. Fibroblast growth factor also has multiple positive effects including blood flow and protection from calcium toxicity to improve outcome in cerebral ischemia (Mattson, M.P. et al., Semin. Neurosci. (1993) 5:295-307; Doetecj. W.D. et al., J. Neurotrauma (1996) 13:309-316). Basic FGF treatment promotes neoangiogenesis in ischemic myocardium (Schumacher et al., Circulation (1998) 97: 645-650). Basic FGF enhances functional recovery and promotes neuronal sprouting following focal cerebral infarct (Kawamata et al., Proc.Natl. Acad. Sci.(1997) 94 (15):8179-84).	Cerebral ischemia, cancer, atherosclerosis, rheumatoid arthritis, cirrhosis, psoriasis, sarcoidosis, idiopathic pulmonary fibrosis, tumor development, developmental disorders, skeletal disorders, wound repair

Table IV. Quantitative, Tissue-specific mRNA expression detected using SybrMan or TaqMan.

Quantitative, tissue-specific, mRNA expression patterns of the genes were measured using SYBR-Green Quantitative PCR (Applied Biosystems, Foster City, CA) or TaqMan PCR (Perkin Elmer, see Lie et al. Current Opinion in Biotechnology 9:43-48, 1998; Gibson et al., Genome Methods 6:995-1001, 1996) and human cDNAs prepared from various human tissues. Gene-specific PCR primers were designed using the first nucleic acid sequence listed in the Sequence List for each gene. Results are presented as the number of copies of each specific gene's mRNA detected in 1ng mRNA pool from each tissue. Two replicate mRNA measurements were made from each tissue RNA.

SybrMan Results:

Gene Name	Tissue-Specific mRNA Expression (copies per ng mRNA; avg. \pm range for 2 data points per tissue)									
	Brain	Heart	Lung	Liver	Kidney	Skeletal muscle	Intestine	Spleen/lymph	Placenta	Testis
sbgTango79a	358 \pm 7	278 \pm 55	239 \pm 100	53 \pm 20	247 \pm 29	461 \pm 60	83 \pm 1	202 \pm 18	300 \pm 55	770 \pm 106
sbgPRO331a	15411 \pm 861	1831 \pm 25	2409 \pm 103	656 \pm 2	2283 \pm 82	625 \pm 47	510 \pm 5	2096 \pm 74	2596 \pm 68	4692 \pm 472
sbgHPYYa	-3 \pm 1	-1 \pm 0	0 \pm 0	-7 \pm 8	8 \pm 2	-5 \pm 9	-4 \pm 1	2 \pm 1	-1 \pm 0	38 \pm 5
sbgHGTa	24 \pm 10	5 \pm 4	5 \pm 3	-4 \pm 8	2 \pm 1	-3 \pm 5	-1 \pm 3	4 \pm 2	4 \pm 0	92 \pm 8
SB-HDGF	4362 \pm 359	3387 \pm 11	2425 \pm 120	972 \pm 82	3270 \pm 152	7106 \pm 1647	1133 \pm 164	2058 \pm 101	2528 \pm 50	9024 \pm 652
SBhACRP30a	10751 \pm 954	7443 \pm 294	9900 \pm 780	6463 \pm 45	8530 \pm 225	7638 \pm 405	6040 \pm 438	8912 \pm 1021	8931 \pm 617	8098 \pm 612
sbg35069DBIa	142 \pm 15	180 \pm 17	94 \pm 10	37 \pm 3	257 \pm 15	73 \pm 8	27 \pm 10	76 \pm 29	184 \pm 5	158 \pm 2
sbg14862SPERCta	31 \pm 3	18 \pm 6	23 \pm 4	10 \pm 6	49 \pm 1	8 \pm 7	7 \pm 0	23 \pm 1	18 \pm 2	30 \pm 1
sbg24878SIa	327 \pm 29	1251 \pm 8	1740 \pm 103	552 \pm 20	514 \pm 182	636 \pm 65	582 \pm 64	5200 \pm 222	5151 \pm 271	695 \pm 30
sbg34976IGBa	1500 \pm 64	451 \pm 21	123 \pm 14	9 \pm 6	55 \pm 6	156 \pm 6	38 \pm 12	80 \pm 4	76 \pm 3	1975 \pm 183
sbg41608HDGFa	11 \pm 4	3 \pm 0	4 \pm 4	2 \pm 0	0 \pm 1	1 \pm 2	1 \pm 0	7 \pm 5	0 \pm 0	14909 \pm 926
sbg66804SPARCra	296 \pm 53	24 \pm 0	4 \pm 1	457 \pm 21	7 \pm 0	68 \pm 3	9 \pm 1	439 \pm 11	128 \pm 1	1037 \pm 17
sbg72825FOLATEa	289 \pm 40	381 \pm 12	100 \pm 78	92 \pm 3	494 \pm 102	289 \pm 52	101 \pm 3	219 \pm 30	405 \pm 121	270 \pm 44
SBhPRO221	14 \pm 6	109 \pm 43	102 \pm 30	221 \pm 44	19 \pm 9	6 \pm 5	61 \pm 13	60 \pm 19	33 \pm 11	119 \pm 40
sbg77153CYSa	50 \pm 8	80 \pm 32	181 \pm 3	10 \pm 2	234 \pm 50	54 \pm 7	25 \pm 8	93 \pm 0	151 \pm 3	26223 \pm 604
SBh80014.IAPa	6 \pm 10	82 \pm 70	31 \pm 3	-2 \pm 3	110 \pm 1	88 \pm 24	17 \pm 4	29 \pm 1	62 \pm 3	65 \pm 20

Table IV (cont).

TaqMan Results:

Gene Name	Tissue-Specific mRNA Expression (copies per ng mRNA; avg. \pm SD for 4 data points per tissue)							
	Brain	Heart	Lung	Liver	Kidney	Skeletal muscle	Intestine	Spleen
sbgFGF-19b	9 \pm 9	25 \pm 30	8 \pm 11	1612 \pm 1711	9 \pm 16	10 \pm 9	9 \pm 15	16 \pm 20
								0 \pm 3
								123 \pm 144

Table V. Additional diseases based on mRNA expression in specific tissues

Tissue Expression	Additional Diseases
Brain	Neurological and psychiatric diseases, including Alzheimers, parasupranuclear palsey, Huntington's disease, myotonic dystrophy, anorexia, depression, schizophrenia, headache, amnesias, anxiety disorders, sleep disorders, multiple sclerosis
Heart	Cardiovascular diseases, including congestive heart failure, dilated cardiomyopathy, cardiac arrhythmias, Hodgson's Disease, myocardial infarction, cardiac arrhythmias
Lung	Respiratory diseases, including asthma, Chronic Obstructive Pulmonary Disease, cystic fibrosis, acute bronchitis, adult respiratory distress syndrome
Liver	Dyslipidemia, hypercholesterolemia, hypertriglyceridemia, cirrhosis, hepatic encephalopathy, fatty hepatocirrhosis, viral and nonviral hepatitis, Type II Diabetes Mellitus, impaired glucose tolerance
Kidney	Renal diseases, including acute and chronic renal failure, acute tubular necrosis, cystinuria, Fanconi's Syndrome, glomerulonephritis, renal cell carcinoma, renovascular hypertension
Skeletal muscle	Eulenburg's Disease, hypoglycemia, obesity, tendinitis, periodic paralyses, malignant hyperthermia, paramyotonia congenita, myotonia congenita
Intestine	Gastrointestinal diseases, including Myotonia congenita, Ileus, Intestinal Obstruction, Tropical Sprue, Pseudomembranous Enterocolitis
Spleen/lymph	Lymphangiectasia, hypersplenism, angiomias, ankylosing spondylitis, Hodgkin's Disease, macroglobulinemia, malignant lymphomas, rheumatoid arthritis
Placenta	Choriocarcinoma, hydatidiform mole, placenta previa
Testis	Testicular cancer, male reproductive diseases, including low testosterone and male infertility
Pancreas	Diabetic ketoacidosis, Type 1 & 2 diabetes, obesity, impaired glucose tolerance

What is claimed is:

1. An isolated polypeptide selected from the group consisting of:
 - 5 (a) an isolated polypeptide encoded by a polynucleotide comprising a sequence set forth in Table I;
 - (b) an isolated polypeptide comprising a polypeptide sequence having at least 95% identity to a polypeptide sequence set forth in Table I;
 - (c) an isolated polypeptide comprising a polypeptide sequence set forth in Table I;
 - 10 (d) an isolated polypeptide having at least 95% identity to a polypeptide sequence set forth in Table I;
 - (e) a polypeptide sequence of a gene set forth in Table I; and
 - (f) fragments and variants of such polypeptides in (a) to (e)
- 15 2. An isolated polynucleotide selected from the group consisting of:
 - (a) an isolated polynucleotide comprising a polynucleotide sequence having at least 95% identity to a polynucleotide sequence set forth in Table I;
 - (b) an isolated polynucleotide comprising a polynucleotide set forth in Table I;
 - (c) an isolated polynucleotide having at least 95% identity to a polynucleotide set forth in Table I;
 - 20 (d) an isolated polynucleotide of a gene set forth in Table I;
 - (e) an isolated polynucleotide comprising a polynucleotide sequence encoding a polypeptide sequence having at least 95% identity to the polypeptide sequence set forth in Table I;
 - (f) an isolated polynucleotide comprising a polynucleotide sequence encoding a polypeptide set forth in Table I;
 - 25 (g) an isolated polynucleotide having a polynucleotide sequence encoding a polypeptide sequence having at least 95% identity to a polypeptide sequence set forth in Table I;
 - (h) an isolated polynucleotide encoding a polypeptide set forth in Table I;
 - (i) an isolated polynucleotide with a nucleotide sequence of at least 100 nucleotides obtained by screening a library under stringent hybridization conditions with a labelled probe having a sequence
 - 30 set forth in Table I or a fragment thereof having at least 15 nucleotides;
 - (j) a polynucleotide which is an RNA equivalent of the polynucleotide of (a) to (i);
 - or a polynucleotide sequence complementary to said isolated polynucleotide
 - and polynucleotides that are variants and fragments of the above mentioned polynucleotides or that
 - are complementary to above mentioned polynucleotides, over the entire length thereof.

3. An antibody immunospecific for the polypeptide of claim 1.
4. An antibody as claimed in claim 3 which is a polyclonal antibody.
- 5 5. An expression vector comprising a polynucleotide capable of producing a polypeptide of claim 1 when said expression vector is present in a compatible host cell.
6. A process for producing a recombinant host cell which comprises the step of introducing an expression vector comprising a polynucleotide capable of producing a polypeptide of claim 1 into a
10 cell such that the host cell, under appropriate culture conditions, produces said polypeptide.
7. A recombinant host cell produced by the process of claim 6.
8. A membrane of a recombinant host cell of claim 7 expressing said polypeptide.
- 15 9. A process for producing a polypeptide which comprises culturing a host cell of claim 7 under conditions sufficient for the production of said polypeptide and recovering said polypeptide from the culture.

SEQUENCE LISTING

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SMITHKLINE BEECHAM p.l.c.

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<210> 15

<211> 756

<212> DNA

<213> Homo sapiens

<400> 15

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<210> 16

<211> 1224

<212> DNA

<213> Homo sapiens

<400> 16

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<210> 17

<211> 1305

<212> DNA

<213> Homo sapiens

<400> 17

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<210> 18

<211> 753

<212> DNA

<213> Homo sapiens

<400> 18

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<210> 19

<211> 774

<212> DNA

<213> Homo sapiens

<400> 19

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<210> 20

<211> 447

<212> DNA

<213> Homo sapiens

<400> 20

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<210> 21

<211> 1068

<212> DNA

<213> Homo sapiens

<400> 21

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<210> 22

<211> 769

<212> DNA

<213> Homo sapiens

<400> 22

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<210> 23

<211> 756

<212> DNA

<213> Homo sapiens

<400> 23

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<210> 24

<211> 592

<212> PRT

<213> Homo sapiens

<400> 24

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Val	Gln	Thr	Arg	Ala	Val	Ala	Cys	Thr	Arg	Arg	Arg	Leu	Thr	Ala	Val
		35					40					45			
Pro	Asp	Gly	Ile	Pro	Ala	Glu	Thr	Arg	Leu	Leu	Glu	Leu	Ser	Arg	Asn
		50				55					60				
Arg	Ile	Arg	Cys	Leu	Asn	Pro	Gly	Asp	Leu	Ala	Ala	Leu	Pro	Ala	Leu
65					70					75				80	
Glu	Glu	Leu	Asp	Leu	Ser	Glu	Asn	Ala	Ile	Ala	His	Val	Glu	Pro	Gly
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Gln	Leu	Lys	Leu	Ile	Pro	Pro	Gly	Val	Phe	Thr	Arg	Leu	Asp	Asn	Leu
		115					120						125		
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				165					170					175	
Glu	Glu	Leu	Thr	Leu	Glu	Arg	Cys	Asn	Leu	Thr	Ala	Leu	Ser	Gly	Glu
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Ser	Leu	Gly	His	Leu	Arg	Ser	Leu	Gly	Ala	Leu	Arg	Leu	Arg	His	Leu
		195					200						205		
Ala	Ile	Ala	Ser	Leu	Glu	Asp	Gln	Asn	Phe	Arg	Arg	Leu	Pro	Gly	Leu
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Gly	Ser	Leu	Arg	Gly	Leu	Asn	Leu	Thr	Ser	Leu	Ser	Val	Thr	His	Thr
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Thr Cys Leu Asn Leu Ser His Asn Pro Ile Ser Thr Val Pro Arg Gly
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 Ser Phe Arg Asp Leu Val Arg Leu Arg Glu Leu His Leu Ala Gly Ala
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 Leu Leu Ala Val Val Glu Pro Gln Ala Phe Leu Gly Leu Arg Gln Ile
 305 310 315 320
 Arg Leu Leu Asn Leu Ser Asn Asn Leu Leu Ser Thr Leu Glu Glu Ser
 325 330 335
 Thr Phe His Ser Val Asn Thr Leu Glu Thr Leu Arg Val Asp Gly Asn
 340 345 350
 Pro Leu Ala Cys Asp Cys Arg Leu Leu Trp Ile Val Gln Arg Arg Lys
 355 360 365
 Thr Leu Asn Phe Asp Gly Arg Leu Pro Ala Cys Ala Thr Pro Ala Glu
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 Val Arg Gly Asp Ala Leu Arg Asn Leu Pro Asp Ser Val Leu Phe Glu
 385 390 395 400
 Tyr Phe Val Cys Arg Lys Pro Lys Ile Arg Glu Arg Arg Leu Gln Arg
 405 410 415
 Val Thr Ala Thr Ala Gly Glu Asp Val Arg Phe Leu Cys Arg Ala Glu
 420 425 430
 Gly Glu Pro Ala Pro Thr Val Ala Trp Val Thr Pro Gln His Arg Pro
 435 440 445
 Val Thr Ala Thr Ser Ala Gly Arg Ala Arg Val Leu Pro Gly Gly Thr
 450 455 460
 Leu Glu Ile Gln Asp Ala Arg Pro Gln Asp Ser Gly Thr Tyr Thr Cys
 465 470 475 480
 Val Ala Ser Asn Ala Gly Gly Asn Asp Thr Tyr Phe Ala Thr Leu Thr
 485 490 495
 Val Arg Pro Glu Pro Ala Ala Asn Arg Thr Pro Gly Glu Ala His Asn
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 Val Ser Thr Ala Met Gly Cys Ile Thr Phe Leu Gly Val Val Leu Phe
 530 535 540
 Cys Phe Val Leu Leu Phe Val Trp Ser Arg Gly Arg Gly Gln His Lys
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 Asn Asn Phe Ser Val Glu Tyr Ser Phe Arg Lys Val Asp Gly Pro Ala
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<210> 25

<211> 653

<212> PRT

<213> Homo sapiens

<400> 25

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          20           25           30
Ala Ala Ile Ala Ala Ala Ala Ser Ala Gly Pro Gln Asn Cys Pro Ser
          35           40           45
Val Cys Ser Cys Ser Asn Gln Phe Ser Lys Val Val Cys Thr Arg Arg
          50           55           60
Gly Leu Ser Glu Val Pro Gln Gly Ile Pro Ser Asn Thr Arg Tyr Leu
65           70           75           80
Asn Leu Met Glu Asn Asn Ile Gln Met Ile Gln Ala Asp Thr Phe Arg
          85           90           95
His Leu His His Leu Glu Val Leu Gln Leu Gly Arg Asn Ser Ile Arg
          100          105          110
Gln Ile Glu Val Gly Ala Phe Asn Gly Leu Ala Ser Leu Asn Thr Leu
          115          120          125
Glu Leu Phe Asp Asn Trp Leu Thr Val Ile Pro Ser Gly Ala Phe Glu
          130          135          140
Tyr Leu Ser Lys Leu Arg Glu Leu Trp Leu Arg Asn Asn Pro Ile Glu
145          150          155          160
Ser Ile Pro Ser Tyr Ala Phe Asn Arg Val Pro Ser Leu Met Arg Leu
          165          170          175
Asp Leu Gly Glu Leu Lys Lys Leu Glu Tyr Ile Ser Glu Gly Ala Phe
          180          185          190
Glu Gly Leu Phe Asn Leu Lys Tyr Leu Asn Leu Gly Met Cys Asn Ile
          195          200          205
Lys Asp Met Pro Asn Leu Thr Pro Leu Val Gly Leu Glu Glu Leu Glu
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Met Ser Gly Asn His Phe Pro Glu Ile Arg Pro Gly Ser Phe His Gly
225          230          235          240
Leu Ser Ser Leu Lys Lys Leu Trp Val Met Asn Ser Gln Val Ser Leu
          245          250          255
Ile Glu Arg Asn Ala Phe Asp Gly Leu Ala Ser Leu Val Glu Leu Asn
          260          265          270
Leu Ala His Asn Asn Leu Ser Ser Leu Pro His Asp Leu Phe Thr Pro
          275          280          285
Leu Arg Tyr Leu Val Glu Leu His Leu His His Asn Pro Trp Asn Cys

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290	295	300
Asp Cys Asp Ile Leu Trp	Leu Ala Trp Trp	Leu Arg Glu Tyr Ile Pro
305	310	315
Thr Asn Ser Thr Cys Cys	Gly Arg Cys His	Ala Pro Met His Met Arg
325	330	335
Gly Arg Tyr Leu Val Glu	Val Asp Gln Ala Ser	Phe Gln Cys Ser Ala
340	345	350
Pro Phe Ile Met Asp Ala	Pro Arg Asp Leu Asn	Ile Ser Glu Gly Arg
355	360	365
Met Ala Glu Leu Lys Cys	Arg Thr Pro Pro	Met Ser Ser Val Lys Trp
370	375	380
Leu Leu Pro Asn Gly Thr	Val Leu Ser His	Ala Ser Arg His Pro Arg
385	390	395
Ile Ser Val Leu Asn Asp	Gly Thr Leu Asn	Phe Ser His Val Leu Leu
405	410	415
Ser Asp Thr Gly Val Tyr	Thr Cys Met Val	Thr Asn Val Ala Gly Asn
420	425	430
Ser Asn Ala Ser Ala Tyr	Leu Asn Val Ser	Thr Ala Glu Leu Asn Thr
435	440	445
Ser Asn Tyr Ser Phe Phe	Thr Thr Val Thr	Val Glu Thr Thr Glu Ile
450	455	460
Ser Pro Glu Asp Thr Thr	Arg Lys Tyr Lys	Pro Val Pro Thr Thr Ser
465	470	475
Thr Gly Tyr Gln Pro Ala	Tyr Thr Thr Ser	Thr Thr Val Leu Ile Gln
485	490	495
Thr Thr Arg Val Pro Lys	Gln Val Ala Val	Pro Ala Thr Asp Thr Thr
500	505	510
Asp Lys Met Gln Thr Ser	Leu Asp Glu Val	Met Lys Thr Thr Lys Ile
515	520	525
Ile Ile Gly Cys Phe Val	Ala Val Thr Leu	Leu Ala Ala Met Leu
530	535	540
Ile Val Phe Tyr Lys Leu	Arg Lys Arg His	Gln Gln Arg Ser Thr Val
545	550	555
Thr Ala Ala Arg Thr Val	Glu Ile Ile Gln	Val Asp Glu Asp Ile Pro
565	570	575
Ala Ala Thr Ser Ala Ala	Ala Thr Ala Ala	Pro Ser Gly Val Ser Gly
580	585	590
Glu Gly Ala Val Val Leu	Pro Thr Ile His	Asp His Ile Asn Tyr Asn
595	600	605
Thr Tyr Lys Pro Ala His	Gly Ala His Trp	Thr Glu Asn Ser Leu Gly
610	615	620
Asn Ser Leu His Pro Thr	Val Thr Thr Ile	Ser Glu Pro Tyr Ile Ile

625 630 635 640
 Gln Thr His Thr Lys Asp Lys Val Gln Glu Thr Gln Ile
 645 650

<210> 26
 <211> 70
 <212> PRT
 <213> Homo sapiens

<400> 26
 Met Val Ser Val Cys Arg Pro Trp Pro Ala Val Ala Ile Ala Leu Leu
 1 5 10 15
 Ala Leu Leu Val Cys Leu Gly Ala Leu Val Asp Thr Cys Pro Ile Lys
 20 25 30
 Pro Glu Ala Pro Gly Glu Asp Glu Ser Leu Glu Glu Leu Ser His Tyr
 35 40 45
 Tyr Ala Ser Leu Cys His Tyr Leu Asn Val Val Thr Arg Gln Trp Trp
 50 55 60
 Glu Gly Ala Asp Met Trp
 65 70

<210> 27
 <211> 130
 <212> PRT
 <213> Homo sapiens

<400> 27
 Met Lys Leu Ala Phe Leu Phe Leu Gly Pro Met Ala Leu Leu Leu Leu
 1 5 10 15
 Ala Gly Tyr Gly Cys Val Leu Gly Ala Ser Ser Gly Asn Leu Arg Thr
 20 25 30
 Phe Val Gly Cys Ala Val Arg Glu Phe Thr Phe Leu Ala Lys Lys Pro
 35 40 45
 Gly Cys Arg Gly Leu Arg Ile Thr Thr Asp Ala Cys Trp Gly Arg Cys
 50 55 60
 Glu Thr Trp Glu Lys Pro Ile Leu Glu Pro Pro Tyr Ile Glu Ala His
 65 70 75 80
 His Arg Val Cys Thr Tyr Asn Glu Thr Lys Gln Val Thr Val Lys Leu
 85 90 95
 Pro Asn Cys Ala Pro Gly Val Asp Pro Phe Tyr Thr Tyr Pro Val Ala
 100 105 110
 Ile Arg Cys Asp Cys Gly Ala Cys Ser Thr Ala Thr Thr Glu Cys Glu

115 120 125
 Thr Ile
 130

 <210> 28
 <211> 676
 <212> PRT
 <213> Homo sapiens

 <400> 28
 Ile Pro Asn Ala Phe Lys Pro Gly Asp Leu Val Phe Pro Lys Ile Lys
 1 5 10 15
 Gly Tyr Pro Gln Trp Pro Ser Arg Ile Asp Asp Ile Ala Asp Gly Ala
 20 25 30
 Val Lys Pro Pro Pro Asn Lys Tyr Pro Ile Phe Phe Phe Gly Thr His
 35 40 45
 Glu Thr Ala Phe Leu Gly Pro Lys Asp Leu Phe Pro Tyr Asp Lys Cys
 50 55 60
 Lys Asp Lys Tyr Gly Lys Pro Asn Lys Arg Lys Gly Phe Asn Glu Gly
 65 70 75 80
 Leu Trp Glu Ile Gln Asn Asn Pro His Ala Ser Tyr Ser Ala Pro Pro
 85 90 95
 Pro Val Ser Ser Ser Asp Ser Glu Ala Pro Glu Ala Asn Pro Ala Asp
 100 105 110
 Gly Ser Asp Ala Asp Glu Asp Asp Glu Asp Arg Gly Val Met Ala Val
 115 120 125
 Thr Ala Val Thr Ala Thr Ala Ala Ser Asp Arg Met Glu Ser Asp Ser
 130 135 140
 Asp Ser Asp Lys Ser Ser Asp Asn Ser Gly Leu Lys Arg Lys Thr Pro
 145 150 155 160
 Ala Leu Lys Met Ser Val Ser Lys Arg Ala Arg Lys Ala Ser Ser Asp
 165 170 175
 Leu Asp Gln Ala Ser Val Ser Pro Ser Glu Glu Glu Asn Ser Glu Ser
 180 185 190
 Ser Ser Glu Ser Glu Lys Thr Ser Asp Gln Asp Phe Thr Pro Glu Lys
 195 200 205
 Lys Ala Ala Val Arg Ala Pro Arg Arg Gly Pro Leu Gly Gly Arg Lys
 210 215 220
 Lys Lys Lys Ala Pro Ser Ala Ser Asp Ser Asp Ser Lys Ala Asp Ser
 225 230 235 240
 Asp Gly Ala Lys Pro Glu Pro Val Ala Met Ala Arg Ser Ala Ser Ser
 245 250 255

Ser Ser Ser Ser Ser Ser Ser Ser Asp Ser Asp Val Ser Val Lys Lys	260	265	270
Pro Pro Arg Gly Arg Lys Pro Ala Glu Lys Pro Leu Pro Lys Pro Arg	275	280	285
Gly Arg Lys Pro Lys Pro Glu Arg Pro Pro Ser Ser Ser Ser Ser Asp	290	295	300
Ser Asp Ser Asp Glu Val Asp Arg Ile Ser Glu Trp Lys Arg Arg Asp	305	310	315
Glu Ala Arg Arg Arg Glu Leu Glu Ala Arg Arg Arg Arg Glu Gln Glu	325	330	335
Glu Glu Leu Arg Arg Leu Arg Glu Gln Glu Lys Glu Glu Lys Glu Arg	340	345	350
Arg Arg Glu Arg Ala Asp Arg Gly Glu Ala Glu Arg Gly Ser Gly Gly	355	360	365
Ser Ser Gly Asp Glu Leu Arg Glu Asp Asp Glu Pro Val Lys Lys Arg	370	375	380
Gly Arg Lys Gly Arg Gly Arg Gly Pro Pro Ser Ser Ser Asp Ser Glu	385	390	395
Pro Glu Ala Glu Leu Glu Arg Glu Ala Lys Lys Ser Ala Lys Lys Pro	405	410	415
Gln Ser Ser Ser Thr Glu Pro Ala Arg Lys Pro Gly Gln Lys Glu Lys	420	425	430
Arg Val Arg Pro Glu Glu Lys Gln Gln Ala Lys Pro Val Lys Val Glu	435	440	445
Arg Thr Arg Lys Arg Ser Glu Gly Phe Ser Met Asp Arg Lys Val Glu	450	455	460
Lys Lys Lys Glu Pro Ser Val Glu Glu Lys Leu Gln Lys Leu His Ser	465	470	475
Glu Ile Lys Phe Ala Leu Lys Val Asp Ser Pro Asp Val Lys Arg Cys	485	490	495
Leu Asn Ala Leu Glu Glu Leu Gly Thr Leu Gln Val Thr Ser Gln Ile	500	505	510
Leu Gln Lys Asn Thr Asp Val Val Ala Thr Leu Lys Lys Ile Arg Arg	515	520	525
Tyr Lys Ala Asn Lys Asp Val Met Glu Lys Ala Ala Glu Val Tyr Thr	530	535	540
Arg Leu Lys Ser Arg Val Leu Gly Pro Lys Ile Glu Ala Val Gln Lys	545	550	555
Val Asn Lys Ala Gly Met Glu Lys Glu Lys Ala Glu Glu Lys Leu Ala	565	570	575
Gly Glu Glu Leu Ala Gly Glu Glu Leu Ala Gly Glu Glu Ala Pro Gln	580	585	590

Glu Lys Ala Glu Asp Lys Pro Ser Thr Asp Leu Ser Ala Pro Val Asn
 595 600 605
 Gly Glu Ala Thr Ser Gln Lys Gly Glu Ser Ala Glu Asp Lys Glu His
 610 615 620
 Glu Glu Gly Arg Asp Ser Glu Glu Gly Pro Arg Cys Gly Ser Ser Glu
 625 630 635 640
 Asp Leu His Asp Ser Val Arg Glu Gly Pro Asp Leu Asp Arg Pro Gly
 645 650 655
 Ser Asp Arg Gln Glu Arg Glu Arg Ala Arg Gly Asp Ser Glu Ala Leu
 660 665 670
 Asp Glu Glu Ser
 675

<210> 29

<211> 717

<212> PRT

<213> Homo sapiens

<400> 29

Met Ala Val Leu Asp Leu Arg Glu Leu Arg Arg Gly Asp Leu Gly Gly
 1 5 10 15
 Val Gln Gly Leu Lys Glu Leu Arg Arg Gln Trp Ser Gly Gly Pro Gly
 20 25 30
 Pro Glu Glu Ala Ala Leu Trp Gly Ser Gly Ala Ser Val Pro Glu Gly
 35 40 45
 Ala Ala Pro Trp Gly Ser Gly Val Ala Leu Ala Gln Arg Glu Pro Arg
 50 55 60
 Leu Ile Asp Asp Ile Ala Asp Gly Ala Val Lys Pro Pro Pro Asn Lys
 65 70 75 80
 Tyr Pro Ile Phe Phe Phe Gly Thr His Glu Thr Ala Phe Leu Gly Pro
 85 90 95
 Lys Asp Leu Phe Pro Tyr Asp Lys Cys Lys Asp Lys Tyr Gly Lys Pro
 100 105 110
 Asn Lys Arg Lys Gly Phe Asn Glu Gly Leu Trp Glu Ile Gln Asn Asn
 115 120 125
 Pro His Ala Ser Tyr Ser Ala Pro Pro Pro Val Ser Ser Ser Asp Ser
 130 135 140
 Glu Ala Pro Glu Ala Asn Pro Ala Asp Gly Ser Asp Ala Asp Glu Asp
 145 150 155 160
 Asp Glu Asp Arg Gly Val Met Ala Val Thr Ala Val Thr Ala Thr Ala
 165 170 175
 Ala Ser Asp Arg Met Glu Ser Asp Ser Asp Ser Asp Lys Ser Ser Asp

			180				185				190				
Asn	Ser	Gly	Leu	Lys	Arg	Lys	Thr	Pro	Ala	Leu	Lys	Met	Ser	Val	Ser
			195				200				205				
Lys	Arg	Ala	Arg	Lys	Ala	Ser	Ser	Asp	Leu	Asp	Gln	Ala	Ser	Val	Ser
			210				215				220				
Pro	Ser	Glu	Glu	Glu	Asn	Ser	Glu	Ser	Ser	Ser	Glu	Ser	Glu	Lys	Thr
225			230				235				240				
Ser	Asp	Gln	Asp	Phe	Thr	Pro	Glu	Lys	Lys	Ala	Ala	Val	Arg	Ala	Pro
			245				250				255				
Arg	Arg	Gly	Pro	Leu	Gly	Gly	Arg	Lys	Lys	Lys	Lys	Ala	Pro	Ser	Ala
			260				265				270				
Ser	Asp	Ser	Asp	Ser	Lys	Ala	Asp	Ser	Asp	Gly	Ala	Lys	Pro	Glu	Pro
275			280				285								
Val	Ala	Met	Ala	Arg	Ser	Ala	Ser	Ser	Ser	Ser	Ser	Ser	Ser	Ser	Ser
290			295				300								
Ser	Asp	Ser	Asp	Val	Ser	Val	Lys	Lys	Pro	Pro	Arg	Gly	Arg	Lys	Pro
305			310				315				320				
Ala	Glu	Lys	Pro	Leu	Pro	Lys	Pro	Arg	Gly	Arg	Lys	Pro	Lys	Pro	Glu
			325				330				335				
Arg	Pro	Pro	Ser	Ser	Ser	Ser	Ser	Asp	Ser	Asp	Ser	Asp	Glu	Val	Asp
			340				345				350				
Arg	Ile	Ser	Glu	Trp	Lys	Arg	Arg	Asp	Glu	Ala	Arg	Arg	Arg	Glu	Leu
355			360				365								
Glu	Ala	Arg	Arg	Arg	Arg	Glu	Gln	Glu	Glu	Glu	Leu	Arg	Arg	Leu	Arg
370			375				380								
Glu	Gln	Glu	Lys	Glu	Glu	Lys	Glu	Arg	Arg	Arg	Glu	Arg	Ala	Asp	Arg
385			390				395				400				
Gly	Glu	Ala	Glu	Arg	Gly	Ser	Gly	Gly	Ser	Ser	Gly	Asp	Glu	Leu	Arg
			405				410				415				
Glu	Asp	Asp	Glu	Pro	Val	Lys	Lys	Arg	Gly	Arg	Lys	Gly	Arg	Gly	Arg
			420				425				430				
Gly	Pro	Pro	Ser	Ser	Ser	Asp	Ser	Glu	Pro	Glu	Ala	Glu	Leu	Glu	Arg
435			440				445								
Glu	Ala	Lys	Lys	Ser	Ala	Lys	Lys	Pro	Gln	Ser	Ser	Ser	Thr	Glu	Pro
450			455				460								
Ala	Arg	Lys	Pro	Gly	Gln	Lys	Glu	Lys	Arg	Val	Arg	Pro	Glu	Glu	Lys
465			470				475				480				
Gln	Gln	Ala	Lys	Pro	Val	Lys	Val	Glu	Arg	Thr	Arg	Lys	Arg	Ser	Glu
			485				490				495				
Gly	Phe	Ser	Met	Asp	Arg	Lys	Val	Glu	Lys	Lys	Lys	Glu	Pro	Ser	Val
500			505				510								
Glu	Glu	Lys	Leu	Gln	Lys	Leu	His	Ser	Glu	Ile	Lys	Phe	Ala	Leu	Lys

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      515              520              525
Val Asp Ser Pro Asp Val Lys Arg Cys Leu Asn Ala Leu Glu Glu Leu
      530              535              540
Gly Thr Leu Gln Val Thr Ser Gln Ile Leu Gln Lys Asn Thr Asp Val
      545              550              555              560
Val Ala Thr Leu Lys Lys Ile Arg Arg Tyr Lys Ala Asn Lys Asp Val
      565              570              575
Met Glu Lys Ala Ala Glu Val Tyr Thr Arg Leu Lys Ser Arg Val Leu
      580              585              590
Gly Pro Lys Ile Glu Ala Val Gln Lys Val Asn Lys Ala Gly Met Glu
      595              600              605
Lys Glu Lys Ala Glu Glu Lys Leu Ala Gly Glu Glu Leu Ala Gly Glu
      610              615              620
Glu Leu Ala Gly Glu Glu Ala Pro Gln Glu Lys Ala Glu Asp Lys Pro
      625              630              635              640
Ser Thr Asp Leu Ser Ala Pro Val Asn Gly Glu Ala Thr Ser Gln Lys
      645              650              655
Gly Glu Ser Ala Glu Asp Lys Glu His Glu Glu Gly Arg Asp Ser Glu
      660              665              670
Glu Gly Pro Arg Cys Gly Ser Ser Glu Asp Leu His Asp Ser Val Arg
      675              680              685
Glu Gly Pro Asp Leu Asp Arg Pro Gly Ser Asp Arg Gln Glu Arg Glu
      690              695              700
Arg Ala Arg Gly Asp Ser Glu Ala Leu Asp Glu Glu Ser
      705              710              715

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<210> 30

<211> 288

<212> PRT

<213> Homo sapiens

<400> 30

```

Met Phe Val Leu Leu Tyr Val Thr Ser Phe Ala Ile Cys Ala Ser Gly
  1              5              10              15
Gln Pro Arg Gly Asn Gln Leu Lys Gly Glu Asn Tyr Ser Pro Arg Tyr
      20              25              30
Ile Cys Ser Ile Pro Gly Leu Pro Gly Pro Pro Gly Pro Pro Gly Ala
      35              40              45
Asn Gly Ser Pro Gly Pro His Gly Arg Ile Gly Leu Pro Gly Arg Asp
      50              55              60
Gly Arg Asp Gly Arg Lys Gly Glu Lys Gly Glu Lys Gly Thr Ala Leu
      65              70              75              80

```

Arg Gly Lys Thr Gly Pro Leu Gly Leu Ala Gly Glu Lys Gly Asp Gln
 85 90 95
 Gly Glu Thr Gly Lys Lys Gly Pro Ile Gly Pro Glu Gly Glu Lys Gly
 100 105 110
 Glu Val Gly Pro Ile Gly Pro Pro Gly Pro Lys Gly Asp Arg Gly Glu
 115 120 125
 Gln Gly Asp Pro Gly Leu Pro Gly Val Cys Arg Cys Gly Ser Ile Val
 130 135 140
 Leu Lys Ser Ala Phe Ser Val Gly Ile Thr Thr Ser Tyr Pro Glu Glu
 145 150 155 160
 Arg Leu Pro Ile Ile Phe Asn Lys Val Leu Phe Asn Glu Gly Glu His
 165 170 175
 Tyr Asn Pro Ala Thr Gly Lys Phe Ile Cys Ala Phe Pro Gly Ile Tyr
 180 185 190
 Tyr Phe Ser Tyr Asp Ile Thr Leu Ala Asn Lys His Leu Ala Ile Gly
 195 200 205
 Leu Val His Asn Gly Gln Tyr Arg Ile Lys Thr Phe Asp Ala Asn Thr
 210 215 220
 Gly Asn His Asp Val Ala Ser Gly Ser Thr Val Ile Tyr Leu Gln Pro
 225 230 235 240
 Glu Asp Glu Val Trp Leu Glu Ile Phe Phe Thr Asp Gln Asn Gly Leu
 245 250 255
 Phe Ser Asp Pro Gly Trp Ala Asp Ser Leu Phe Ser Gly Phe Leu Leu
 260 265 270
 Tyr Val Asp Thr Asp Tyr Leu Asp Ser Ile Ser Glu Asp Asp Glu Leu
 275 280 285

<210> 31

<211> 303

<212> PRT

<213> Homo sapiens

<400> 31

Met Gly Lys Glu Asp Thr Gln Glu Thr Arg Thr Glu Pro Lys Met Phe
 1 5 10 15
 Val Leu Leu Tyr Val Thr Ser Phe Ala Ile Cys Ala Ser Gly Gln Pro
 20 25 30
 Arg Gly Asn Gln Leu Lys Gly Glu Asn Tyr Ser Pro Arg Tyr Ile Cys
 35 40 45
 Ser Ile Pro Gly Leu Pro Gly Pro Pro Gly Pro Pro Gly Ala Asn Gly
 50 55 60
 Ser Pro Gly Pro His Gly Arg Ile Gly Leu Pro Gly Arg Asp Gly Arg


```

65              70              75              80
Asp Gly Arg Lys Gly Glu Lys Gly Glu Lys Gly Thr Ala Gly Leu Arg
              85              90              95
Gly Lys Thr Gly Pro Leu Gly Leu Ala Gly Glu Lys Gly Asp Gln Gly
              100              105              110
Glu Thr Gly Lys Lys Gly Pro Ile Gly Pro Glu Gly Glu Lys Gly Glu
              115              120              125
Val Gly Pro Ile Gly Pro Pro Gly Pro Lys Gly Asp Arg Gly Glu Gln
              130              135              140
Gly Asp Pro Gly Leu Pro Gly Val Cys Arg Cys Gly Ser Ile Val Leu
145              150              155              160
Lys Ser Ala Phe Ser Val Gly Ile Thr Thr Ser Tyr Pro Glu Glu Arg
              165              170              175
Leu Pro Ile Ile Phe Asn Lys Val Leu Phe Asn Glu Gly Glu His Tyr
              180              185              190
Asn Pro Ala Thr Gly Lys Phe Ile Cys Ala Phe Pro Gly Ile Tyr Tyr
              195              200              205
Phe Ser Tyr Asp Ile Thr Leu Ala Asn Lys His Leu Ala Ile Gly Leu
              210              215              220
Val His Asn Gly Gln Tyr Arg Ile Lys Thr Phe Asp Ala Asn Thr Gly
225              230              235              240
Asn His Asp Val Ala Ser Gly Ser Thr Val Ile Tyr Leu Gln Pro Glu
              245              250              255
Asp Glu Val Trp Leu Glu Ile Phe Phe Thr Asp Gln Asn Gly Leu Phe
              260              265              270
Ser Asp Pro Gly Trp Ala Asp Ser Leu Phe Ser Gly Phe Leu Leu Tyr
              275              280              285
Val Asp Thr Asp Tyr Leu Asp Ser Ile Ser Glu Asp Asp Glu Leu
              290              295              300

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<210> 32

<211> 88

<212> PRT

<213> Homo sapiens

<400> 32

```

Met Ser Leu Gln Ala Asp Phe Asp Met Val Thr Glu Asp Val Arg Lys
1              5              10              15
Leu Lys Thr Arg Pro Asp Asp Glu Glu Leu Lys Glu Leu Tyr Gly Leu
              20              25              30
Tyr Lys Gln Ala Val Ile Gly Asn Ile Asn Ile Glu Cys Ser Glu Met
              35              40              45

```

Leu Glu Leu Lys Gly Lys Ala Lys Trp Glu Ala Gln Asn Pro Gln Lys
 50 55 60
 Gly Leu Ser Glu Glu Asp Met Met Arg Ala Phe Ile Ser Lys Ala Glu
 65 70 75 80
 Glu Leu Ile Glu Lys Tyr Gly Ile
 85

<210> 33

<211> 422

<212> PRT

<213> Homo sapiens

<400> 33

Met His Gly Gly Ser Trp Gly Ser Val Cys Asp Asp Asp Trp Asp Val
 1 5 10 15
 Val Asp Ala Asn Val Val Cys Arg Gln Leu Gly Cys Gly Leu Ala Leu
 20 25 30
 Pro Val Pro Arg Pro Leu Ala Phe Gly Gln Gly Arg Gly Pro Ile Leu
 35 40 45
 Leu Asp Asn Val Glu Cys Arg Gly Gln Glu Ala Ala Leu Ser Glu Cys
 50 55 60
 Gly Ser Arg Gly Trp Gly Val His Asn Cys Phe His Tyr Glu Asp Val
 65 70 75 80
 Ala Val Leu Cys Asp Gly Glu Gly Ser Val Arg Leu Val Gly Gly Ala
 85 90 95
 Asn Leu Cys Gln Gly Arg Val Glu Ile Leu His Ser Gly Leu Trp Gly
 100 105 110
 Thr Val Cys Asp Asp Asp Trp Gly Leu Pro Asp Ala Ala Val Val Cys
 115 120 125
 Arg Gln Leu Gly Cys Gly Ala Ala Met Ala Ala Thr Thr Asn Ala Phe
 130 135 140
 Phe Gly Tyr Gly Thr Gly His Ile Leu Leu Asp Asn Val His Cys Glu
 145 150 155 160
 Gly Gly Glu Pro Arg Leu Ala Ala Cys Gln Ser Leu Gly Trp Gly Val
 165 170 175
 His Asn Cys Gly His His Glu Asp Ala Gly Ala Leu Cys Ala Gly Ala
 180 185 190
 Gly Ser Arg Gly Asp Gly Arg Gly Arg Gly Ser Pro Ser Gly Arg Gly
 195 200 205
 Pro Val Arg Pro Ala Gly Gly Arg Leu Arg Leu Val Gly Gly Pro Gly
 210 215 220
 Pro Cys Arg Gly Arg Val Glu Val Leu His Ala Gly Gly Trp Gly Thr

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<210> 34
<211> 552
<212> PRT
<213> Homo sapiens
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Met	Ala	Thr	Leu	Pro	Glu	Lys	Ala	Leu	Lys	Glu	Ala	Trp	Lys	Gly	Leu
1				5					10					15	
Ile	Pro	Arg	Phe	Pro	Trp	Leu	His	Gly	Lys	Ala	Glu	Leu	Arg	Leu	Val
			20					25					30		
Gly	Gly	Pro	Ser	Arg	Cys	Arg	Gly	Arg	Leu	Glu	Val	Met	His	Gly	Gly
		35					40					45			
Ser	Trp	Gly	Ser	Val	Cys	Asp	Asp	Asp	Trp	Asp	Val	Val	Asp	Ala	Asn
	50					55					60				
Val	Val	Cys	Arg	Gln	Leu	Gly	Cys	Gly	Leu	Ala	Leu	Pro	Val	Pro	Arg
65					70					75					80

Pro	Leu	Ala	Phe	Gly	Gln	Gly	Arg	Gly	Pro	Ile	Leu	Leu	Asp	Asn	Val	85	90	95
Glu	Cys	Arg	Gly	Gln	Glu	Ala	Ala	Leu	Ser	Glu	Cys	Gly	Ser	Arg	Gly	100	105	110
Trp	Gly	Val	His	Asn	Cys	Phe	His	Tyr	Glu	Asp	Val	Ala	Val	Leu	Cys	115	120	125
Asp	Glu	Phe	Leu	Pro	Thr	Gln	Pro	Pro	Thr	Arg	Lys	Met	Leu	Thr	Ser	130	135	140
Arg	Ala	Pro	Pro	Thr	Thr	Leu	Pro	Asn	Gly	Lys	Ser	Glu	Gly	Ser	Val	145	150	155
Arg	Leu	Val	Gly	Gly	Ala	Asn	Leu	Cys	Gln	Gly	Arg	Val	Glu	Ile	Leu	165	170	175
His	Ser	Gly	Leu	Trp	Gly	Thr	Val	Cys	Asp	Asp	Asp	Trp	Gly	Leu	Pro	180	185	190
Asp	Ala	Ala	Val	Val	Cys	Arg	Gln	Leu	Gly	Cys	Gly	Ala	Ala	Met	Ala	195	200	205
Ala	Thr	Thr	Asn	Ala	Phe	Phe	Gly	Tyr	Gly	Thr	Gly	His	Ile	Leu	Leu	210	215	220
Asp	Asn	Val	His	Cys	Glu	Gly	Gly	Glu	Pro	Arg	Leu	Ala	Ala	Cys	Gln	225	230	235
Ser	Leu	Gly	Trp	Gly	Val	His	Asn	Cys	Gly	His	His	Glu	Asp	Ala	Gly	245	250	255
Ala	Leu	Cys	Ala	Gly	Leu	Gly	Pro	Pro	Thr	Leu	Thr	Ala	Leu	Pro	Ser	260	265	270
Ser	Ala	Thr	Arg	Glu	Asp	Trp	Ala	Trp	Gln	Thr	Asp	Pro	Ser	Ala	Thr	275	280	285
Gly	Val	Gly	Pro	Gln	Pro	Ser	Arg	Glu	Thr	Ala	Leu	Leu	Thr	Thr	Ala	290	295	300
Ala	Trp	Ala	Ala	Gly	Lys	Lys	Ser	Gly	Arg	Leu	Arg	Leu	Val	Gly	Gly	305	310	315
Pro	Gly	Pro	Cys	Arg	Gly	Arg	Val	Glu	Val	Leu	His	Ala	Gly	Gly	Trp	325	330	335
Gly	Thr	Val	Cys	Asp	Asp	Asp	Trp	Asp	Phe	Ala	Asp	Ala	Arg	Val	Ala	340	345	350
Cys	Arg	Glu	Ala	Gly	Cys	Gly	Pro	Ala	Leu	Gly	Ala	Thr	Gly	Leu	Gly	355	360	365
His	Phe	Gly	Tyr	Gly	Arg	Gly	Pro	Val	Leu	Leu	Asp	Asn	Val	Gly	Cys	370	375	380
Ala	Gly	Thr	Glu	Ala	Arg	Leu	Ser	Asp	Cys	Phe	His	Leu	Gly	Trp	Gly	385	390	395
Gln	His	Asn	Cys	Gly	His	His	Glu	Asp	Ala	Gly	Ala	Leu	Cys	Ala	Gly	405	410	415

Glu Ala Asp Ser Glu Gly Pro Glu Glu Leu Gly Leu Gln Val Gln Gln
 420 425 430
 Asp Gly Ser Glu Thr Thr Arg Val Pro Thr Pro Arg Pro Arg Asp Gly
 435 440 445
 His Leu Arg Leu Val Asn Gly Ala His Arg Cys Glu Gly Arg Val Glu
 450 455 460
 Leu Tyr Leu Gly Gln Arg Trp Gly Thr Val Cys Asp Asp Ala Trp Asp
 465 470 475 480
 Leu Arg Ala Ala Gly Val Leu Cys Arg Gln Leu Gly Cys Gly Gln Ala
 485 490 495
 Leu Ala Ala Pro Gly Glu Ala His Phe Gly Pro Gly Arg Gly Pro Ile
 500 505 510
 Leu Leu Asp Asn Val Lys Cys Arg Gly Glu Glu Ser Ala Leu Leu Leu
 515 520 525
 Cys Ser His Ile Arg Trp Asp Ala His Asn Cys Asp His Ser Glu Asp
 530 535 540
 Ala Ser Val Leu Cys Gln Pro Ser
 545 550

<210> 35

<211> 1709

<212> PRT

<213> Homo sapiens

<400> 35

Met Gly Phe Leu Pro Lys Leu Leu Leu Leu Ala Ser Phe Phe Pro Ala
 1 5 10 15
 Gly Gln Ala Ser Trp Gly Val Ser Ser Pro Gln Asp Val Gln Gly Val
 20 25 30
 Lys Gly Ser Cys Leu Leu Ile Pro Cys Ile Phe Ser Phe Pro Ala Asp
 35 40 45
 Val Glu Val Pro Asp Gly Ile Thr Ala Ile Trp Tyr Tyr Asp Tyr Ser
 50 55 60
 Gly Gln Arg Gln Val Val Ser His Ser Ala Asp Pro Lys Leu Val Glu
 65 70 75 80
 Ala Arg Phe Arg Gly Arg Thr Glu Phe Met Gly Asn Pro Glu His Arg
 85 90 95
 Val Cys Asn Leu Leu Leu Lys Asp Leu Gln Pro Glu Asp Ser Gly Ser
 100 105 110
 Tyr Asn Phe Arg Phe Glu Ile Ser Glu Val Asn Arg Trp Ser Asp Val
 115 120 125
 Lys Gly Thr Leu Val Thr Val Thr Glu Glu Pro Arg Val Pro Thr Ile

130		135		140	
Ala Ser Pro Val Glu Leu	Leu Glu Gly Thr Glu Val	Asp Phe Asn Cys			
145		150		155	160
Ser Thr Pro Tyr Val Cys	Leu Gln Glu Gln Val Arg	Leu Gln Trp Gln			
	165		170		175
Gly Gln Asp Pro Ala Arg	Ser Val Thr Phe Asn Ser	Gln Lys Phe Glu			
	180		185		190
Pro Thr Gly Val Gly His	Leu Glu Thr Leu His Met	Ala Met Ser Trp			
	195		200		205
Gln Asp His Gly Arg Ile	Leu Arg Cys Gln Leu Ser	Val Ala Asn His			
	210		215		220
Arg Ala Gln Ser Glu Ile	His Leu Gln Val Lys Tyr	Ala Pro Lys Gly			
	225		230		240
Val Lys Ile Leu Leu Ser	Pro Ser Gly Arg Asn Ile	Leu Pro Gly Glu			
	245		250		255
Leu Val Thr Leu Thr Cys	Gln Val Asn Ser Ser Tyr	Pro Ala Val Ser			
	260		265		270
Ser Ile Lys Trp Leu Lys	Asp Gly Val Arg Leu Gln	Thr Lys Thr Gly			
	275		280		285
Val Leu His Leu Pro Gln	Ala Ala Trp Ser Asp Ala	Gly Val Tyr Thr			
	290		295		300
Cys Gln Ala Glu Asn Gly	Val Gly Ser Leu Val Ser	Pro Pro Ile Ser			
	305		310		320
Leu His Ile Phe Met Ala	Glu Val Gln Val Ser Pro	Ala Gly Pro Ile			
	325		330		335
Leu Glu Asn Gln Thr Val	Thr Leu Val Cys Asn Thr	Pro Asn Glu Ala			
	340		345		350
Pro Ser Asp Leu Arg Tyr	Ser Trp Tyr Lys Asn His	Val Leu Leu Glu			
	355		360		365
Asp Ala His Ser His Thr	Leu Arg Leu His Leu Ala	Thr Arg Ala Asp			
	370		375		380
Thr Gly Phe Tyr Phe Cys	Glu Val Gln Asn Val His	Gly Ser Glu Arg			
	385		390		400
Ser Gly Pro Val Ser Val	Val Val Asn Leu Leu Thr	Ala Phe Leu Glu			
	405		410		415
Thr Gln Ala Gly Leu Val	Gly Ile Leu His Cys Ser	Val Val Ser Glu			
	420		425		430
Pro Leu Ala Thr Leu Val	Leu Ser His Gly Gly His	Ile Leu Ala Ser			
	435		440		445
Thr Ser Gly Asp Ser Asp	His Ser Pro Arg Phe Ser	Gly Thr Ser Gly			
	450		455		460
Pro Asn Ser Leu Arg Leu	Glu Ile Arg Asp Leu Glu	Glu Thr Asp Ser			

465	470	475	480
Gly Glu Tyr Lys Cys Ser Ala Thr Asn Ser Leu Gly Asn Ala Thr Ser			
	485	490	495
Thr Leu Asp Phe His Ala Asn Ala Ala Arg Leu Leu Ile Ser Pro Ala			
	500	505	510
Ala Glu Val Val Glu Gly Gln Ala Val Thr Leu Ser Cys Arg Ser Gly			
	515	520	525
Leu Ser Pro Thr Pro Asp Ala Arg Phe Ser Trp Tyr Leu Asn Gly Ala			
	530	535	540
Leu Leu His Glu Gly Pro Gly Ser Ser Leu Leu Leu Pro Ala Ala Ser			
545	550	555	560
Ser Thr Asp Ala Gly Ser Tyr His Cys Arg Ala Arg Asp Gly His Ser			
	565	570	575
Ala Ser Gly Pro Ser Ser Pro Ala Val Leu Thr Val Leu Tyr Pro Pro			
	580	585	590
Arg Gln Pro Thr Phe Thr Thr Arg Leu Asp Leu Asp Ala Ala Gly Ala			
	595	600	605
Gly Ala Gly Arg Arg Gly Leu Leu Leu Cys Arg Val Asp Ser Asp Pro			
	610	615	620
Pro Ala Arg Leu Gln Leu Leu His Lys Asp Arg Val Val Ala Thr Ser			
625	630	635	640
Leu Pro Ser Gly Gly Gly Cys Ser Thr Cys Gly Gly Cys Ser Pro Arg			
	645	650	655
Met Lys Val Thr Lys Ala Pro Asn Leu Leu Arg Val Glu Ile His Asn			
	660	665	670
Pro Leu Leu Glu Glu Glu Gly Leu Tyr Leu Cys Glu Ala Ser Asn Ala			
	675	680	685
Leu Gly Asn Ala Ser Thr Ser Ala Thr Phe Asn Gly Gln Ala Thr Val			
	690	695	700
Leu Ala Ile Ala Pro Ser His Thr Leu Gln Glu Gly Thr Glu Ala Asn			
705	710	715	720
Leu Thr Cys Asn Val Ser Arg Glu Ala Ala Gly Ser Pro Ala Asn Phe			
	725	730	735
Ser Trp Phe Arg Asn Gly Val Leu Trp Ala Gln Gly Pro Leu Glu Thr			
	740	745	750
Val Thr Leu Leu Pro Val Ala Arg Thr Asp Ala Ala Leu Tyr Ala Cys			
	755	760	765
Arg Ile Leu Thr Glu Ala Gly Ala Gln Leu Ser Thr Pro Val Leu Leu			
	770	775	780
Ser Val Leu Tyr Pro Pro Asp Arg Pro Lys Leu Ser Ala Leu Leu Asp			
785	790	795	800
Met Gly Gln Gly His Met Ala Leu Phe Ile Cys Thr Val Asp Ser Arg			

Pro Leu Ala Leu Leu Ala Leu Phe His Gly Glu His Leu Leu Ala Thr
 820 825 830
 Ser Leu Gly Pro Gln Val Pro Ser His Gly Arg Phe Gln Ala Lys Ala
 835 840 845
 Glu Ala Asn Ser Leu Lys Leu Glu Val Arg Glu Leu Gly Leu Gly Asp
 850 855 860
 Ser Gly Ser Tyr Arg Cys Glu Ala Thr Asn Val Leu Gly Ser Ser Asn
 865 870 875 880
 Thr Ser Leu Phe Phe Gln Val Arg Gly Ala Trp Val Gln Val Ser Pro
 885 890 895
 Ser Pro Glu Leu Gln Glu Gly Gln Ala Val Val Leu Ser Cys Gln Val
 900 905 910
 His Thr Gly Val Pro Glu Gly Thr Ser Tyr Arg Trp Tyr Arg Asp Gly
 915 920 925
 Gln Pro Leu Gln Glu Ser Thr Ser Ala Thr Leu Arg Phe Ala Ala Ile
 930 935 940
 Thr Leu Thr Gln Ala Gly Ala Tyr His Cys Gln Ala Gln Ala Pro Gly
 945 950 955 960
 Ser Ala Thr Thr Ser Leu Ala Ala Pro Ile Ser Leu His Val Ser Tyr
 965 970 975
 Ala Pro Arg His Val Thr Leu Thr Thr Leu Met Asp Thr Gly Pro Gly
 980 985 990
 Arg Leu Gly Leu Leu Leu Cys Arg Val Asp Ser Asp Pro Pro Ala Gln
 995 1000 1005
 Leu Arg Leu Leu His Gly Asp Arg Leu Val Ala Ser Thr Leu Gln Gly
 1010 1015 1020
 Val Gly Gly Pro Glu Gly Ser Ser Pro Arg Leu His Val Ala Val Ala
 1025 1030 1035 1040
 Pro Asn Thr Leu Arg Leu Glu Ile His Gly Ala Met Leu Glu Asp Glu
 1045 1050 1055
 Gly Val Tyr Ile Cys Glu Ala Ser Asn Thr Leu Gly Gln Ala Ser Ala
 1060 1065 1070
 Ser Ala Asp Phe Asp Ala Gln Ala Val Asn Val Gln Val Trp Pro Gly
 1075 1080 1085
 Ala Thr Val Arg Glu Gly Gln Leu Val Asn Leu Thr Cys Leu Val Trp
 1090 1095 1100
 Thr Thr His Pro Ala Gln Leu Thr Tyr Thr Trp Tyr Gln Asp Gly Gln
 1105 1110 1115 1120
 Gln Arg Leu Asp Ala His Ser Ile Pro Leu Pro Asn Val Thr Val Arg
 1125 1130 1135
 Asp Ala Thr Ser Tyr Arg Cys Gly Val Gly Pro Pro Gly Arg Ala Pro

1140	1145	1150
Arg Leu Ser Arg Pro Ile Thr Leu Asp Val Leu Tyr Ala Pro Arg Asn		
1155	1160	1165
Leu Arg Leu Thr Tyr Leu Leu Glu Ser His Gly Gly Gln Leu Ala Leu		
1170	1175	1180
Val Leu Cys Thr Val Asp Ser Arg Pro Pro Ala Gln Leu Ala Leu Ser		
1185	1190	1195
His Ala Gly Arg Leu Leu Ala Ser Ser Thr Ala Ala Ser Val Pro Asn		1200
1205	1210	1215
Thr Leu Arg Leu Glu Leu Arg Gly Pro Gln Pro Arg Asp Glu Gly Phe		
1220	1225	1230
Tyr Ser Cys Ser Ala Arg Ser Pro Leu Gly Gln Ala Asn Thr Ser Leu		
1235	1240	1245
Glu Leu Arg Leu Glu Gly Val Arg Val Ile Leu Ala Pro Glu Ala Ala		
1250	1255	1260
Val Pro Glu Gly Ala Pro Ile Thr Val Thr Cys Ala Asp Pro Ala Ala		
1265	1270	1275
His Ala Pro Thr Leu Tyr Thr Trp Tyr His Asn Gly Arg Trp Leu Gln		1280
1285	1290	1295
Glu Gly Pro Ala Ala Ser Leu Ser Phe Leu Val Ala Thr Arg Ala His		
1300	1305	1310
Ala Gly Ala Tyr Ser Cys Gln Ala Gln Asp Ala Gln Gly Thr Arg Ser		
1315	1320	1325
Ser Arg Pro Ala Ala Leu Gln Val Leu Tyr Ala Pro Gln Asp Ala Val		
1330	1335	1340
Leu Ser Ser Phe Arg Asp Ser Arg Ala Arg Ser Met Ala Val Ile Gln		
1345	1350	1355
Cys Thr Val Asp Ser Glu Pro Pro Ala Glu Leu Ala Leu Ser His Asp		1360
1365	1370	1375
Gly Lys Val Leu Ala Thr Ser Ser Gly Val His Ser Leu Ala Ser Gly		
1380	1385	1390
Thr Gly His Val Gln Val Ala Arg Asn Ala Leu Arg Leu Gln Val Gln		
1395	1400	1405
Asp Val Pro Ala Gly Asp Asp Thr Tyr Val Cys Thr Ala Gln Asn Leu		
1410	1415	1420
Leu Gly Ser Ile Ser Thr Ile Gly Arg Leu Gln Val Glu Gly Ala Arg		
1425	1430	1435
Val Val Ala Glu Pro Gly Leu Asp Val Pro Glu Gly Ala Ala Leu Asn		1440
1445	1450	1455
Leu Ser Cys Arg Leu Leu Gly Gly Pro Gly Pro Val Gly Asn Ser Thr		
1460	1465	1470
Phe Ala Trp Phe Trp Asn Asp Arg Arg Leu His Ala Glu Pro Val Pro		

1475					1480					1485					
Thr	Leu	Ala	Phe	Thr	His	Val	Ala	Arg	Ala	Gln	Ala	Gly	Met	Tyr	His
1490					1495					1500					
Cys	Leu	Ala	Glu	Leu	Pro	Thr	Gly	Ala	Ala	Ala	Ser	Ala	Pro	Val	Met
1505					1510					1515					1520
Leu	Arg	Val	Leu	Tyr	Pro	Pro	Lys	Thr	Pro	Thr	Met	Met	Val	Phe	Val
1525					1530					1535					
Glu	Pro	Glu	Gly	Gly	Leu	Arg	Gly	Ile	Leu	Asp	Cys	Arg	Val	Asp	Ser
1540					1545					1550					
Glu	Pro	Leu	Ala	Ser	Leu	Thr	Leu	His	Leu	Gly	Ser	Arg	Leu	Val	Ala
1555					1560					1565					
Ser	Ser	Gln	Pro	Gln	Gly	Ala	Pro	Ala	Glu	Pro	His	Ile	His	Val	Leu
1570					1575					1580					
Ala	Ser	Pro	Asn	Ala	Leu	Arg	Val	Asp	Ile	Glu	Ala	Leu	Arg	Pro	Ser
1585					1590					1595					1600
Asp	Gln	Gly	Glu	Tyr	Ile	Cys	Ser	Ala	Ser	Asn	Val	Leu	Gly	Ser	Ala
1605					1610					1615					
Ser	Thr	Ser	Thr	Tyr	Phe	Gly	Val	Arg	Ala	Leu	His	Arg	Leu	His	Gln
1620					1625					1630					
Phe	Gln	Gln	Leu	Leu	Trp	Val	Leu	Gly	Leu	Leu	Val	Gly	Leu	Leu	Leu
1635					1640					1645					
Leu	Leu	Leu	Gly	Leu	Gly	Ala	Cys	Tyr	Thr	Trp	Arg	Arg	Arg	Arg	Val
1650					1655					1660					
Cys	Lys	Gln	Ser	Met	Gly	Glu	Asn	Ser	Val	Glu	Met	Ala	Phe	Gln	Lys
1665					1670					1675					1680
Glu	Thr	Thr	Gln	Gly	Phe	Leu	Cys	Gly	Lys	Leu	Ile	Asp	Pro	Asp	Ala
1685					1690					1695					
Ala	Thr	Cys	Glu	Thr	Ser	Thr	Cys	Ala	Pro	Pro	Leu	Gly			
1700					1705										

<210> 36

<211> 1694

<212> PRT

<213> Homo sapiens

<400> 36

Met	Gly	Phe	Leu	Pro	Lys	Leu	Leu	Leu	Leu	Ala	Ser	Phe	Phe	Pro	Ala
1				5					10					15	
Gly	Gln	Ala	Ser	Trp	Gly	Val	Ser	Ser	Pro	Gln	Asp	Val	Gln	Gly	Val
			20					25					30		
Lys	Gly	Ser	Cys	Leu	Leu	Ile	Pro	Cys	Ile	Phe	Ser	Phe	Pro	Ala	Asp
		35						40				45			

Val Glu Val Pro Asp Gly Ile Thr Ala Ile Trp Tyr Tyr Asp Tyr Ser
 50 55 60
 Gly Gln Arg Gln Val Val Ser His Ser Ala Asp Pro Lys Leu Val Glu
 65 70 75 80
 Ala Arg Phe Arg Gly Arg Thr Glu Phe Met Gly Asn Pro Glu His Arg
 85 90 95
 Val Cys Asn Leu Leu Leu Lys Asp Leu Gln Pro Glu Asp Ser Gly Ser
 100 105 110
 Tyr Asn Phe Arg Phe Glu Ile Ser Glu Val Asn Arg Trp Ser Asp Val
 115 120 125
 Lys Gly Thr Leu Val Thr Val Thr Glu Glu Pro Arg Val Pro Thr Ile
 130 135 140
 Ala Ser Pro Val Glu Leu Leu Glu Gly Thr Glu Val Asp Phe Asn Cys
 145 150 155 160
 Ser Thr Pro Tyr Val Cys Leu Gln Glu Gln Val Arg Leu Gln Trp Gln
 165 170 175
 Gly Gln Asp Pro Ala Arg Ser Val Thr Phe Asn Ser Gln Lys Phe Glu
 180 185 190
 Pro Thr Gly Val Gly His Leu Glu Thr Leu His Met Ala Met Ser Trp
 195 200 205
 Gln Asp His Gly Arg Ile Leu Arg Cys Gln Leu Ser Val Ala Asn His
 210 215 220
 Arg Ala Gln Ser Glu Ile His Leu Gln Val Lys Tyr Ala Pro Lys Gly
 225 230 235 240
 Val Lys Ile Leu Leu Ser Pro Ser Gly Arg Asn Ile Leu Pro Gly Glu
 245 250 255
 Leu Val Thr Leu Thr Cys Gln Val Asn Ser Ser Tyr Pro Ala Val Ser
 260 265 270
 Ser Ile Lys Trp Leu Lys Asp Gly Val Arg Leu Gln Thr Lys Thr Gly
 275 280 285
 Val Leu His Leu Pro Gln Ala Ala Trp Ser Asp Ala Gly Val Tyr Thr
 290 295 300
 Cys Gln Ala Glu Asn Gly Val Gly Ser Leu Val Ser Pro Pro Ile Ser
 305 310 315 320
 Leu His Ile Phe Met Ala Glu Val Gln Val Ser Pro Ala Gly Pro Ile
 325 330 335
 Leu Glu Asn Gln Thr Val Thr Leu Val Cys Asn Thr Pro Asn Glu Ala
 340 345 350
 Pro Ser Asp Leu Arg Tyr Ser Trp Tyr Lys Asn His Val Leu Leu Glu
 355 360 365
 Asp Ala His Ser His Thr Leu Arg Leu His Leu Ala Thr Arg Ala Asp
 370 375 380

Thr Gly Phe Tyr Phe Cys Glu Val Gln Asn Val His Gly Ser Glu Arg			
385	390	395	400
Ser Gly Pro Val Ser Val Val Val Asn Leu Leu Thr Ala Phe Leu Glu			
	405	410	415
Thr Gln Ala Gly Leu Val Gly Ile Leu His Cys Ser Val Val Ser Glu			
	420	425	430
Pro Leu Ala Thr Leu Val Leu Ser His Gly Gly His Ile Leu Ala Ser			
	435	440	445
Thr Ser Gly Asp Ser Asp His Ser Pro Arg Phe Ser Gly Thr Ser Gly			
	450	455	460
Pro Asn Ser Leu Arg Leu Glu Ile Arg Asp Leu Glu Glu Thr Asp Ser			
	465	470	475
Gly Glu Tyr Lys Cys Ser Ala Thr Asn Ser Leu Gly Asn Ala Thr Ser			
	485	490	495
Thr Leu Asp Phe His Ala Asn Ala Ala Arg Leu Leu Ile Ser Pro Ala			
	500	505	510
Ala Glu Val Val Glu Gly Gln Ala Val Thr Leu Ser Cys Arg Ser Gly			
	515	520	525
Leu Ser Pro Thr Pro Asp Ala Arg Phe Ser Trp Tyr Leu Asn Gly Ala			
	530	535	540
Leu Leu His Glu Gly Pro Gly Ser Ser Leu Leu Leu Pro Ala Ala Ser			
	545	550	555
Ser Thr Asp Ala Gly Ser Tyr His Cys Arg Ala Arg Asp Gly His Ser			
	565	570	575
Ala Ser Gly Pro Ser Ser Pro Ala Val Leu Thr Val Leu Tyr Pro Pro			
	580	585	590
Arg Gln Pro Thr Phe Thr Thr Arg Leu Asp Leu Asp Ala Ala Gly Ala			
	595	600	605
Gly Ala Gly Arg Arg Gly Leu Leu Leu Cys Arg Val Asp Ser Asp Pro			
	610	615	620
Pro Ala Arg Leu Gln Leu Leu His Lys Asp Arg Val Val Ala Thr Ser			
	625	630	635
Leu Pro Ser Gly Gly Gly Cys Ser Thr Cys Gly Gly Cys Ser Pro Arg			
	645	650	655
Met Lys Val Thr Lys Ala Pro Asn Leu Leu Arg Val Glu Ile His Asn			
	660	665	670
Pro Leu Leu Glu Glu Glu Gly Leu Tyr Leu Cys Glu Ala Ser Asn Ala			
	675	680	685
Leu Gly Asn Ala Ser Thr Ser Ala Thr Phe Asn Gly Gln Ala Thr Val			
	690	695	700
Leu Ala Ile Ala Pro Ser His Thr Leu Gln Glu Gly Thr Glu Ala Asn			
	705	710	715
			720

Leu Thr Cys Asn Val Ser Arg Glu Ala Ala Gly Ser Pro Ala Asn Phe
 725 730 735
 Ser Trp Phe Arg Asn Gly Val Leu Trp Ala Gln Gly Pro Leu Glu Thr
 740 745 750
 Val Thr Leu Leu Pro Val Ala Arg Thr Asp Ala Ala Leu Tyr Ala Cys
 755 760 765
 Arg Ile Leu Thr Glu Ala Gly Ala Gln Leu Ser Thr Pro Val Leu Leu
 770 775 780
 Ser Val Leu Tyr Pro Pro Asp Arg Pro Lys Leu Ser Ala Leu Leu Asp
 785 790 795 800
 Met Gly Gln Gly His Met Ala Leu Phe Ile Cys Thr Val Asp Ser Arg
 805 810 815
 Pro Leu Ala Leu Leu Ala Leu Phe His Gly Glu His Leu Leu Ala Thr
 820 825 830
 Ser Leu Gly Pro Gln Val Pro Ser His Gly Arg Phe Gln Ala Lys Ala
 835 840 845
 Glu Ala Asn Ser Leu Lys Leu Glu Val Arg Glu Leu Gly Leu Gly Asp
 850 855 860
 Ser Gly Ser Tyr Arg Cys Glu Ala Thr Asn Val Leu Gly Ser Ser Asn
 865 870 875 880
 Thr Ser Leu Phe Phe Gln Val Arg Gly Ala Trp Val Gln Val Ser Pro
 885 890 895
 Ser Pro Glu Leu Gln Glu Gly Gln Ala Val Val Leu Ser Cys Gln Val
 900 905 910
 His Thr Gly Val Pro Glu Gly Thr Ser Tyr Arg Trp Tyr Arg Asp Gly
 915 920 925
 Gln Pro Leu Gln Glu Ser Thr Ser Ala Thr Leu Arg Phe Ala Ala Ile
 930 935 940
 Thr Leu Thr Gln Ala Gly Ala Tyr His Cys Gln Ala Gln Ala Pro Gly
 945 950 955 960
 Ser Ala Thr Thr Ser Leu Ala Ala Pro Ile Ser Leu His Val Ser Tyr
 965 970 975
 Ala Pro Arg His Val Thr Leu Thr Thr Leu Met Asp Thr Gly Pro Gly
 980 985 990
 Arg Leu Gly Leu Leu Leu Cys Arg Val Asp Ser Asp Pro Pro Ala Gln
 995 1000 1005
 Leu Arg Leu Leu His Gly Asp Arg Leu Val Ala Ser Thr Leu Gln Gly
 1010 1015 1020
 Val Gly Gly Pro Glu Gly Ser Ser Pro Arg Leu His Val Ala Val Ala
 1025 1030 1035 1040
 Pro Asn Thr Leu Arg Leu Glu Ile His Gly Ala Met Leu Glu Asp Glu
 1045 1050 1055

Gly Val Tyr Ile Cys Glu Ala Ser Asn Thr Leu Gly Gln Ala Ser Ala
 1060 1065 1070
 Ser Ala Asp Phe Asp Ala Gln Ala Val Asn Val Gln Val Trp Pro Gly
 1075 1080 1085
 Ala Thr Val Arg Glu Gly Gln Leu Val Asn Leu Thr Cys Leu Val Trp
 1090 1095 1100
 Thr Thr His Pro Ala Gln Leu Thr Tyr Thr Trp Tyr Gln Asp Gly Gln
 1105 1110 1115 1120
 Gln Arg Leu Asp Ala His Ser Ile Pro Leu Pro Asn Val Thr Val Arg
 1125 1130 1135
 Asp Ala Thr Ser Tyr Arg Cys Gly Val Gly Pro Pro Gly Arg Ala Pro
 1140 1145 1150
 Arg Leu Ser Arg Pro Ile Thr Leu Asp Val Leu Tyr Ala Pro Arg Asn
 1155 1160 1165
 Leu Arg Leu Thr Tyr Leu Leu Glu Ser His Gly Gly Gln Leu Ala Leu
 1170 1175 1180
 Val Leu Cys Thr Val Asp Ser Arg Pro Pro Ala Gln Leu Ala Leu Ser
 1185 1190 1195 1200
 His Ala Gly Arg Leu Leu Ala Ser Ser Thr Ala Ala Ser Val Pro Asn
 1205 1210 1215
 Thr Leu Arg Leu Glu Leu Arg Gly Pro Gln Pro Arg Asp Glu Gly Phe
 1220 1225 1230
 Tyr Ser Cys Ser Ala Arg Ser Pro Leu Gly Gln Ala Asn Thr Ser Leu
 1235 1240 1245
 Glu Leu Arg Leu Glu Gly Val Arg Val Ile Leu Ala Pro Glu Ala Ala
 1250 1255 1260
 Val Pro Glu Gly Ala Pro Ile Thr Val Thr Cys Ala Asp Pro Ala Ala
 1265 1270 1275 1280
 His Ala Pro Thr Leu Tyr Thr Trp Tyr His Asn Gly Arg Trp Leu Gln
 1285 1290 1295
 Glu Gly Pro Ala Ala Ser Leu Ser Phe Leu Val Ala Thr Arg Ala His
 1300 1305 1310
 Ala Gly Ala Tyr Ser Cys Gln Ala Gln Asp Ala Gln Gly Thr Arg Ser
 1315 1320 1325
 Ser Arg Pro Ala Ala Leu Gln Val Leu Tyr Ala Pro Gln Asp Ala Val
 1330 1335 1340
 Leu Ser Ser Phe Arg Asp Ser Arg Ala Arg Ser Met Ala Val Ile Gln
 1345 1350 1355 1360
 Cys Thr Val Asp Ser Glu Pro Pro Ala Glu Leu Ala Leu Ser His Asp
 1365 1370 1375
 Gly Lys Val Leu Ala Thr Ser Ser Gly Val His Ser Leu Ala Ser Gly
 1380 1385 1390

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Thr Gly His Val Gln Val Ala Arg Asn Ala Leu Arg Leu Gln Val Gln
      1395                      1400                      1405
Asp Val Pro Ala Gly Asp Asp Thr Tyr Val Cys Thr Ala Gln Asn Leu
      1410                      1415                      1420
Leu Gly Ser Ile Ser Thr Ile Gly Arg Leu Gln Val Glu Gly Ala Arg
1425                      1430                      1435                      1440
Val Val Ala Glu Pro Gly Leu Asp Val Pro Glu Gly Ala Ala Leu Asn
      1445                      1450                      1455
Leu Ser Cys Arg Leu Leu Gly Gly Pro Gly Pro Val Gly Asn Ser Thr
      1460                      1465                      1470
Phe Ala Trp Phe Trp Asn Asp Arg Arg Leu His Ala Glu Pro Val Pro
      1475                      1480                      1485
Thr Leu Ala Phe Thr His Val Ala Arg Ala Gln Ala Gly Met Tyr His
      1490                      1495                      1500
Cys Leu Ala Glu Leu Pro Thr Gly Ala Ala Ala Ser Ala Pro Val Met
1505                      1510                      1515                      1520
Leu Arg Val Leu Tyr Pro Pro Lys Thr Pro Thr Met Met Val Phe Val
      1525                      1530                      1535
Glu Pro Glu Gly Gly Leu Arg Gly Ile Leu Asp Cys Arg Val Asp Ser
      1540                      1545                      1550
Glu Pro Leu Ala Ser Leu Thr Leu His Leu Gly Ser Arg Leu Val Ala
      1555                      1560                      1565
Ser Ser Gln Pro Gln Gly Ala Pro Ala Glu Pro His Ile His Val Leu
      1570                      1575                      1580
Ala Ser Pro Asn Ala Leu Arg Val Asp Ile Glu Ala Leu Arg Pro Ser
1585                      1590                      1595                      1600
Asp Gln Gly Glu Tyr Ile Cys Ser Ala Ser Asn Val Leu Gly Ser Ala
      1605                      1610                      1615
Ser Thr Ser Thr Tyr Phe Gly Val Arg Ala Leu His Arg Leu His Gln
      1620                      1625                      1630
Phe Gln Gln Leu Leu Trp Val Leu Gly Leu Leu Val Gly Leu Leu Leu
      1635                      1640                      1645
Leu Leu Leu Gly Leu Gly Ala Cys Tyr Thr Trp Arg Asp Trp Val Leu
      1650                      1655                      1660
Pro Tyr Trp Pro Leu Gln Glu Trp Arg Ala Asp Thr Asp Val Val Ser
1665                      1670                      1675                      1680
Ile Leu Ile Pro Ala Pro Asp Ala Ser Leu Phe Met Thr Val
      1685                      1690

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<210> 37

<211> 745

<212> PRT

<213> Homo sapiens

<400> 37

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Met Phe Pro Leu Arg Ala Leu Trp Leu Val Trp Ala Leu Leu Gly Val
 1           5           10           15
Ala Gly Ser Cys Pro Glu Pro Cys Ala Cys Val Asp Lys Tyr Ala His
          20           25           30
Gln Phe Ala Asp Cys Ala Tyr Lys Glu Leu Arg Glu Val Pro Glu Gly
          35           40           45
Leu Pro Ala Asn Val Thr Thr Leu Ser Leu Ser Ala Asn Lys Ile Thr
          50           55           60
Val Leu Arg Arg Gly Ala Phe Ala Asp Val Thr Gln Val Thr Ser Leu
65           70           75           80
Trp Leu Ala His Asn Glu Val Arg Thr Val Glu Pro Gly Ala Leu Ala
          85           90           95
Val Leu Ser Gln Leu Lys Asn Leu Asp Leu Ser His Asn Phe Ile Ser
          100          105          110
Ser Phe Pro Trp Ser Asp Leu Arg Asn Leu Ser Ala Leu Gln Leu Leu
          115          120          125
Lys Met Asn His Asn Arg Leu Gly Ser Leu Pro Arg Asp Ala Leu Gly
          130          135          140
Ala Leu Pro Asp Leu Arg Ser Leu Arg Ile Asn Asn Asn Arg Leu Arg
145          150          155          160
Thr Leu Ala Pro Gly Thr Phe Asp Ala Leu Ser Ala Leu Ser His Leu
          165          170          175
Gln Leu Tyr His Asn Pro Phe His Cys Gly Cys Gly Leu Val Trp Leu
          180          185          190
Gln Ala Trp Ala Ala Ser Thr Arg Val Ser Leu Pro Glu Pro Asp Ser
          195          200          205
Ile Ala Cys Ala Ser Pro Pro Ala Leu Gln Gly Val Pro Val Tyr Arg
          210          215          220
Leu Pro Ala Leu Pro Cys Ala Pro Pro Ser Val His Leu Ser Ala Glu
225          230          235          240
Pro Pro Leu Glu Ala Pro Gly Thr Pro Leu Arg Ala Gly Leu Ala Phe
          245          250          255
Val Leu His Cys Ile Ala Asp Gly His Pro Thr Pro Arg Leu Gln Trp
          260          265          270
Gln Leu Gln Ile Pro Gly Gly Thr Val Val Leu Glu Pro Pro Val Leu
          275          280          285
Ser Gly Glu Asp Asp Gly Val Gly Ala Glu Glu Gly Glu Gly Glu Gly
          290          295          300
Asp Gly Asp Leu Leu Thr Gln Thr Gln Ala Gln Thr Pro Thr Pro Ala

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305		310		315		320									
Pro	Ala	Trp	Pro	Ala	Pro	Pro	Ala	Thr	Pro	Arg	Phe	Leu	Ala	Leu	Ala
		325				330							335		
Asn	Gly	Ser	Leu	Leu	Val	Pro	Leu	Leu	Ser	Ala	Lys	Glu	Ala	Gly	Val
		340						345					350		
Tyr	Thr	Cys	Arg	Ala	His	Asn	Glu	Leu	Gly	Ala	Asn	Ser	Thr	Ser	Ile
		355						360					365		
Arg	Val	Ala	Val	Ala	Ala	Thr	Gly	Pro	Pro	Lys	His	Ala	Pro	Gly	Ala
		370						375					380		
Gly	Gly	Glu	Pro	Asp	Gly	Gln	Ala	Pro	Thr	Ser	Glu	Arg	Lys	Ser	Thr
385						390					395				400
Ala	Lys	Gly	Arg	Gly	Asn	Ser	Val	Leu	Pro	Ser	Lys	Pro	Glu	Gly	Lys
				405						410				415	
Ile	Lys	Gly	Gln	Gly	Leu	Ala	Lys	Val	Ser	Ile	Leu	Gly	Glu	Thr	Glu
				420						425				430	
Thr	Glu	Pro	Glu	Glu	Asp	Thr	Ser	Glu	Gly	Glu	Glu	Ala	Glu	Asp	Gln
		435							440					445	
Ile	Leu	Ala	Asp	Pro	Ala	Glu	Glu	Gln	Arg	Cys	Gly	Asn	Gly	Asp	Pro
		450						455					460		
Ser	Arg	Tyr	Val	Ser	Asn	His	Ala	Phe	Asn	Gln	Ser	Ala	Glu	Leu	Lys
465						470					475				480
Pro	His	Val	Phe	Glu	Leu	Gly	Val	Ile	Ala	Leu	Asp	Val	Ala	Glu	Arg
				485						490				495	
Glu	Ala	Arg	Val	Gln	Leu	Thr	Pro	Leu	Ala	Ala	Arg	Trp	Gly	Pro	Gly
			500						505					510	
Pro	Gly	Gly	Ala	Gly	Gly	Ala	Pro	Arg	Pro	Gly	Arg	Arg	Pro	Leu	Arg
		515						520						525	
Leu	Leu	Tyr	Leu	Cys	Pro	Ala	Gly	Gly	Gly	Ala	Ala	Val	Gln	Trp	Ser
		530						535						540	
Arg	Val	Glu	Glu	Gly	Val	Asn	Ala	Tyr	Trp	Phe	Arg	Gly	Leu	Arg	Pro
545						550					555				560
Gly	Thr	Asn	Tyr	Ser	Val	Cys	Leu	Ala	Leu	Ala	Gly	Glu	Ala	Cys	His
				565						570				575	
Val	Gln	Val	Val	Phe	Ser	Thr	Lys	Lys	Glu	Leu	Pro	Ser	Leu	Leu	Val
			580						585					590	
Ile	Val	Ala	Val	Ser	Val	Phe	Leu	Leu	Val	Leu	Ala	Thr	Val	Pro	Leu
		595						600						605	
Leu	Gly	Ala	Ala	Cys	Cys	His	Leu	Leu	Ala	Lys	His	Pro	Gly	Lys	Pro
		610						615					620		
Tyr	Arg	Leu	Ile	Leu	Arg	Pro	Gln	Ala	Pro	Asp	Pro	Met	Glu	Lys	Arg
625						630					635				640
Ile	Ala	Ala	Asp	Phe	Asp	Pro	Arg	Ala	Ser	Tyr	Leu	Glu	Ser	Glu	Lys

				645					650					655			
Ser	Tyr	Pro	Ala	Gly	Gly	Glu	Ala	Gly	Gly	Glu	Glu	Pro	Glu	Asp	Val		
			660						665					670			
Gln	Gly	Glu	Gly	Leu	Asp	Glu	Asp	Ala	Glu	Gln	Gly	Asp	Pro	Ser	Gly		
			675						680					685			
Asp	Leu	Gln	Arg	Glu	Glu	Ser	Leu	Ala	Ala	Cys	Ser	Leu	Val	Glu	Ser		
			690						695					700			
Gln	Ser	Lys	Ala	Asn	Gln	Glu	Glu	Phe	Glu	Ala	Gly	Ser	Glu	Tyr	Ser		
			705						710					715			720
Asp	Arg	Leu	Pro	Leu	Gly	Ala	Glu	Ala	Val	Asn	Ile	Ala	Gln	Glu	Ile		
									725					730			735
Asn	Gly	Asn	Tyr	Arg	Gln	Thr	Ala	Gly									
			740						745								

<210> 38

<211> 251

<212> PRT

<213> Homo sapiens

<400> 38

Met	Ser	Ala	Tyr	Gly	Met	Pro	Met	Tyr	Lys	Ser	Gly	Asp	Leu	Val	Phe		
1				5					10					15			
Ala	Lys	Leu	Lys	Gly	Tyr	Ala	His	Trp	Pro	Ala	Arg	Ile	Glu	His	Met		
				20					25					30			
Thr	Gln	Pro	Asn	Arg	Tyr	Gln	Val	Phe	Phe	Phe	Gly	Thr	His	Glu	Thr		
				35					40					45			
Ala	Phe	Leu	Ser	Pro	Lys	Arg	Leu	Phe	Pro	Tyr	Lys	Glu	Cys	Lys	Glu		
							55					60					
Lys	Phe	Gly	Lys	Pro	Asn	Lys	Arg	Arg	Gly	Phe	Ser	Ala	Gly	Leu	Trp		
65							70					75			80		
Glu	Ile	Glu	Asn	Asn	Pro	Thr	Val	Gln	Ala	Ser	Asp	Cys	Pro	Leu	Ala		
							85					90			95		
Ser	Glu	Lys	Gly	Ser	Gly	Asp	Gly	Pro	Trp	Pro	Glu	Pro	Glu	Ala	Ala		
							100					105			110		
Glu	Gly	Asp	Glu	Asp	Lys	Pro	Thr	His	Ala	Gly	Gly	Gly	Gly	Asp	Glu		
							115					120			125		
Leu	Gly	Lys	Pro	Asp	Asp	Asp	Lys	Pro	Thr	Glu	Glu	Glu	Lys	Gly	Pro		
							130					135			140		
Leu	Lys	Arg	Ser	Ala	Gly	Asp	Pro	Pro	Glu	Asp	Ala	Pro	Lys	Arg	Pro		
							145					150			155		160
Lys	Glu	Ala	Ala	Pro	Asp	Gln	Glu	Glu	Glu	Ala	Glu	Ala	Glu	Arg	Ala		
							165					170			175		

Ala Glu Ala Glu Arg Ala Ala Ala Ala Ala Thr Ala Val Asp
 180 185 190
 Glu Glu Ser Pro Phe Leu Val Ala Val Glu Asn Gly Ser Ala Pro Ser
 195 200 205
 Glu Pro Gly Leu Val Cys Glu Pro Pro Gln Pro Glu Glu Glu Glu Leu
 210 215 220
 Arg Glu Glu Glu Val Ala Asp Glu Glu Ala Ser Gln Glu Trp His Ala
 225 230 235 240
 Glu Ala Pro Gly Gly Gly Asp Arg Asp Ser Leu
 245 250

<210> 39

<211> 408

<212> PRT

<213> Homo sapiens

<400> 39

Phe Leu Ile Ser Asp Arg Asp Pro Gln Cys Asn Leu His Cys Ser Arg
 1 5 10 15
 Thr Gln Pro Lys Pro Ile Cys Ala Ser Asp Gly Arg Ser Tyr Glu Ser
 20 25 30
 Met Cys Glu Tyr Gln Arg Ala Lys Cys Arg Asp Pro Thr Leu Gly Val
 35 40 45
 Val His Arg Gly Arg Cys Lys Asp Ala Gly Gln Ser Lys Cys Arg Leu
 50 55 60
 Glu Arg Ala Gln Ala Leu Glu Gln Ala Lys Lys Pro Gln Glu Ala Val
 65 70 75 80
 Phe Val Pro Glu Cys Gly Glu Asp Gly Ser Phe Thr Gln Val Gln Cys
 85 90 95
 His Thr Tyr Thr Gly Tyr Cys Trp Cys Val Thr Pro Asp Gly Lys Pro
 100 105 110
 Ile Ser Gly Ser Ser Val Gln Asn Lys Thr Pro Val Cys Ser Gly Ser
 115 120 125
 Val Thr Asp Lys Pro Leu Ser Gln Gly Asn Ser Gly Arg Lys Asp Asp
 130 135 140
 Gly Ser Lys Pro Thr Pro Thr Met Glu Thr Gln Pro Val Phe Asp Gly
 145 150 155 160
 Asp Glu Ile Thr Ala Pro Thr Leu Trp Ile Lys His Leu Val Ile Lys
 165 170 175
 Asp Ser Lys Leu Asn Asn Thr Asn Ile Arg Asn Ser Glu Lys Val Tyr
 180 185 190
 Ser Cys Asp Gln Glu Arg Gln Ser Ala Leu Glu Glu Ala Gln Gln Asn

195	200	205
Pro Arg Glu Gly Ile Val Ile	Pro Glu Cys Ala	Pro Gly Gly Leu Tyr
210	215	220
Lys Pro Val Gln Cys His Gln Ser Thr Gly Tyr Cys Trp Cys Val Leu		
225	230	235
Val Asp Thr Gly Arg Pro Leu Pro Gly Thr Ser Thr Arg Tyr Val Met		
245	250	255
Pro Ser Cys Glu Ser Asp Ala Arg Ala Lys Thr Thr Glu Ala Asp Asp		
260	265	270
Pro Phe Lys Asp Arg Glu Leu Pro Gly Cys Pro Glu Gly Lys Lys Met		
275	280	285
Glu Phe Ile Thr Ser Leu Leu Asp Ala Leu Thr Thr Asp Met Val Gln		
290	295	300
Ala Ile Asn Ser Ala Ala Pro Thr Gly Gly Gly Arg Phe Ser Glu Pro		
305	310	315
Asp Pro Ser His Thr Leu Glu Glu Arg Val Val His Trp Tyr Phe Ser		
325	330	335
Gln Leu Asp Ser Asn Ser Ser Asn Asp Ile Asn Lys Arg Glu Met Lys		
340	345	350
Pro Phe Lys Arg Tyr Val Lys Lys Lys Ala Lys Pro Lys Lys Cys Ala		
355	360	365
Arg Arg Phe Thr Asp Tyr Cys Asp Leu Asn Lys Asp Lys Val Ile Ser		
370	375	380
Leu Pro Glu Leu Lys Gly Cys Leu Gly Val Ser Lys Glu Gly Gly Ser		
385	390	395
Leu Gly Ser Phe Pro Gln Ala Lys		400
405		

<210> 40

<211> 434

<212> PRT

<213> Homo sapiens

<400> 40

Met Ala Gly Ser Gly Pro Pro Leu Pro Thr Cys Asn Ala Glu Val Gly
1 5 10 15
Trp Glu Asn Met Ala Glu Asp Gly Lys Ala Phe Leu Ile Ser Asp Arg
20 25 30
Asp Pro Gln Cys Asn Leu His Cys Ser Arg Thr Gln Pro Lys Pro Ile
35 40 45
Cys Ala Ser Asp Gly Arg Ser Tyr Glu Ser Met Cys Glu Tyr Gln Arg
50 55 60

Ala Lys Cys Arg Asp Pro Thr Leu Gly Val Val His Arg Gly Arg Cys			
65	70	75	80
Lys Asp Ala Gly Gln Ser Lys Cys Arg Leu Glu Arg Ala Gln Ala Leu			
	85	90	95
Glu Gln Ala Lys Lys Pro Gln Glu Ala Val Phe Val Pro Glu Cys Gly			
	100	105	110
Glu Asp Gly Ser Phe Thr Gln Val Gln Cys His Thr Tyr Thr Gly Tyr			
	115	120	125
Cys Trp Cys Val Thr Pro Asp Gly Lys Pro Ile Ser Gly Ser Ser Val			
	130	135	140
Gln Asn Lys Thr Pro Val Cys Ser Gly Ser Val Thr Asp Lys Pro Leu			
145	150	155	160
Ser Gln Gly Asn Ser Gly Arg Lys Asp Asp Gly Ser Lys Pro Thr Pro			
	165	170	175
Thr Met Glu Thr Gln Pro Val Phe Asp Gly Asp Glu Ile Thr Ala Pro			
	180	185	190
Thr Leu Trp Ile Lys His Leu Val Ile Lys Asp Ser Lys Leu Asn Asn			
	195	200	205
Thr Asn Ile Arg Asn Ser Glu Lys Val Tyr Ser Cys Asp Gln Glu Arg			
	210	215	220
Gln Ser Ala Leu Glu Glu Ala Gln Gln Asn Pro Arg Glu Gly Ile Val			
225	230	235	240
Ile Pro Glu Cys Ala Pro Gly Gly Leu Tyr Lys Pro Val Gln Cys His			
	245	250	255
Gln Ser Thr Gly Tyr Cys Trp Cys Val Leu Val Asp Thr Gly Arg Pro			
	260	265	270
Leu Pro Gly Thr Ser Thr Arg Tyr Val Met Pro Ser Cys Glu Ser Asp			
	275	280	285
Ala Arg Ala Lys Thr Thr Glu Ala Asp Asp Pro Phe Lys Asp Arg Glu			
	290	295	300
Leu Pro Gly Cys Pro Glu Gly Lys Lys Met Glu Phe Ile Thr Ser Leu			
305	310	315	320
Leu Asp Ala Leu Thr Thr Asp Met Val Gln Ala Ile Asn Ser Ala Ala			
	325	330	335
Pro Thr Gly Gly Gly Arg Phe Ser Glu Pro Asp Pro Ser His Thr Leu			
	340	345	350
Glu Glu Arg Val Val His Trp Tyr Phe Ser Gln Leu Asp Ser Asn Ser			
	355	360	365
Ser Asn Asp Ile Asn Lys Arg Glu Met Lys Pro Phe Lys Arg Tyr Val			
	370	375	380
Lys Lys Lys Ala Lys Pro Lys Lys Cys Ala Arg Arg Phe Thr Asp Tyr			
385	390	395	400

Cys Asp Leu Asn Lys Asp Lys Val Ile Ser Leu Pro Glu Leu Lys Gly
 405 410 415
 Cys Leu Gly Val Ser Lys Glu Gly Gly Ser Leu Gly Ser Phe Pro Gln
 420 425 430
 Ala Lys

<210> 41
 <211> 250
 <212> PRT
 <213> Homo sapiens

<400> 41
 Met Ala Cys Trp Trp Pro Leu Leu Leu Glu Leu Trp Thr Val Met Pro
 1 5 10 15
 Thr Trp Ala Gly Asp Glu Leu Leu Asn Ile Cys Met Asn Ala Lys His
 20 25 30
 His Lys Arg Val Pro Ser Pro Glu Asp Lys Leu Tyr Glu Glu Cys Ile
 35 40 45
 Pro Trp Lys Asp Asn Ala Cys Cys Thr Leu Thr Thr Ser Trp Glu Ala
 50 55 60
 His Leu Asp Val Ser Pro Leu Tyr Asn Phe Ser Leu Phe His Cys Gly
 65 70 75 80
 Leu Leu Met Pro Gly Cys Arg Lys His Phe Ile Gln Ala Ile Cys Phe
 85 90 95
 Tyr Glu Cys Ser Pro Asn Leu Gly Pro Trp Ile Gln Pro Val Gly Ser
 100 105 110
 Leu Gly Trp Glu Val Ala Pro Ser Gly Gln Gly Glu Arg Val Val Asn
 115 120 125
 Val Pro Leu Cys Gln Glu Asp Cys Glu Glu Trp Trp Glu Asp Cys Arg
 130 135 140
 Met Ser Tyr Thr Cys Lys Ser Asn Trp Arg Gly Gly Trp Asp Trp Ser
 145 150 155 160
 Gln Gly Lys Asn Arg Cys Pro Lys Gly Ala Gln Cys Leu Pro Phe Ser
 165 170 175
 His Tyr Phe Pro Thr Pro Ala Asp Leu Cys Glu Lys Thr Trp Ser Asn
 180 185 190
 Ser Phe Lys Ala Ser Pro Glu Arg Arg Asn Ser Gly Arg Cys Leu Gln
 195 200 205
 Lys Trp Phe Glu Pro Ala Gln Gly Asn Pro Asn Val Ala Val Ala Arg
 210 215 220
 Leu Phe Ala Ser Ser Ala Pro Ser Trp Glu Leu Ser Tyr Thr Ile Met

225	230	235	240
Val Cys Ser Leu Phe	Leu Pro Phe Leu Ser		
	245	250	

<210> 42
 <211> 257
 <212> PRT
 <213> Homo sapiens

<400> 42

Met Gly Thr Val Arg Pro Pro Arg Pro Ser Leu Leu Leu Val Ser Thr			
1	5	10	15
Arg Glu Ser Cys Leu Phe Leu Leu Phe Cys Leu His Leu Gly Ala Ala			
	20	25	30
Cys Pro Gln Pro Cys Arg Cys Pro Asp His Ala Gly Ala Val Ala Val			
	35	40	45
Phe Cys Ser Leu Arg Gly Leu Gln Glu Val Pro Glu Asp Ile Pro Ala			
	50	55	60
Asn Thr Val Leu Leu Lys Leu Asp Ala Asn Lys Ile Ser His Leu Pro			
65	70	75	80
Asp Gly Ala Phe Gln His Leu His Arg Leu Arg Glu Leu Asp Leu Ser			
	85	90	95
His Asn Ala Ile Glu Ala Ile Gly Ser Ala Thr Phe Ala Gly Leu Ala			
	100	105	110
Gly Gly Leu Arg Leu Leu Asp Leu Ser Tyr Asn Arg Ile Gln Arg Ile			
	115	120	125
Pro Lys Asp Ala Leu Gly Lys Leu Ser Ala Lys Ile Arg Leu Ser His			
	130	135	140
Asn Pro Leu His Cys Glu Cys Ala Leu Gln Glu Ala Leu Trp Glu Leu			
145	150	155	160
Lys Leu Asp Pro Asp Ser Val Asp Glu Ile Ala Cys His Thr Ser Val			
	165	170	175
Gln Glu Glu Phe Val Gly Lys Pro Leu Val Gln Ala Leu Asp Ala Gly			
	180	185	190
Ala Ser Leu Cys Ser Val Pro His Arg Thr Thr Asp Val Ala Met Leu			
	195	200	205
Val Thr Met Phe Gly Trp Phe Ala Met Val Ile Ala Tyr Val Val Tyr			
	210	215	220
Tyr Val Arg His Asn Gln Glu Asp Ala Arg Arg His Leu Glu Tyr Leu			
225	230	235	240
Lys Ser Leu Pro Ser Ala Pro Ala Ser Lys Asp Pro Ile Gly Pro Gly			
	245	250	255

Pro

<210> 43
 <211> 148
 <212> PRT
 <213> Homo sapiens

<400> 43

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Met Leu Gly Leu Pro Trp Lys Gly Gly Leu Ser Trp Ala Leu Leu Leu
 1              5              10              15
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      20              25              30
Glu Gln Arg Asp Cys Asp Glu His Asn Val Met Ala Arg Tyr Leu Pro
      35              40              45
Ala Thr Val Glu Phe Ala Val His Thr Phe Asn Gln Gln Ser Lys Asp
      50              55              60
Tyr Tyr Ala Tyr Arg Leu Gly His Ile Leu Asn Ser Trp Lys Glu Gln
65              70              75              80
Val Glu Ser Lys Thr Val Phe Ser Met Glu Leu Leu Leu Gly Arg Thr
      85              90              95
Arg Cys Gly Lys Phe Glu Asp Asp Ile Asp Asn Cys His Phe Gln Glu
      100             105             110
Ser Thr Glu Leu Asn Asn Val Arg Gln Asp Thr Ser Phe Pro Pro Gly
      115             120             125
Tyr Ser Cys Gly Cys His Met Gly Cys Gly Val Gly Thr Gly Ala Thr
      130             135             140
Asp Lys Glu Thr
145

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<210> 44
 <211> 355
 <212> PRT
 <213> Homo sapiens

<400> 44

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Met Gly Pro Lys Asp Ser Ala Lys Cys Leu His Arg Gly Pro Gln Pro
 1              5              10              15
Ser His Trp Ala Ala Gly Asp Gly Pro Thr Gln Glu Arg Cys Gly Pro
      20              25              30
Arg Ser Leu Gly Ser Pro Val Leu Gly Leu Asp Thr Cys Arg Ala Trp
      35              40              45

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Asp His Val Asp Gly Gln Ile Leu Gly Gln Leu Arg Pro Leu Thr Glu
 50 55 60
 Glu Glu Glu Glu Glu Gly Ala Gly Ala Thr Leu Ser Arg Gly Pro Ala
 65 70 75 80
 Phe Pro Gly Met Gly Ser Glu Glu Leu Arg Leu Ala Ser Phe Tyr Asp
 85 90 95
 Trp Pro Leu Thr Ala Glu Val Pro Pro Glu Leu Leu Ala Ala Ala Gly
 100 105 110
 Phe Phe His Thr Gly His Gln Asp Lys Val Arg Cys Phe Phe Cys Tyr
 115 120 125
 Gly Gly Leu Gln Ser Trp Lys Arg Gly Asp Asp Pro Trp Thr Glu His
 130 135 140
 Ala Lys Trp Phe Pro Ser Cys Gln Phe Leu Leu Arg Ser Lys Gly Arg
 145 150 155 160
 Asp Phe Val His Ser Val Gln Glu Thr His Ser Gln Leu Leu Gly Ser
 165 170 175
 Trp Val Ser Ala Thr Ser Pro Arg Gly Ser Gly Trp Gln Trp Gly Pro
 180 185 190
 Ala Pro Pro Ile Ser Pro Arg Pro Asp Gly Leu Trp Leu Leu Pro Gly
 195 200 205
 Pro Val Gly Arg Thr Gly Arg Arg Ser Pro Cys Gly Pro Leu Arg Ser
 210 215 220
 Ser Leu Lys Val Pro Arg Ser Gln Val Gln Ala Arg Asp Pro Leu Gly
 225 230 235 240
 Glu Gly Trp Gly Arg Gly Gly Leu Arg Asp Pro Asp Leu Pro Trp Pro
 245 250 255
 Ile Glu Gly Gly Gly Gln Gly Val Gly Thr Phe Arg Arg Pro Val Leu
 260 265 270
 Leu Gly Gly Val Ser Pro Ala Glu Ala Gln Arg Ala Trp Trp Val Leu
 275 280 285
 Glu Pro Pro Gly Ala Arg Asp Val Glu Ala Gln Leu Arg Arg Leu Gln
 290 295 300
 Glu Glu Arg Thr Cys Lys Val Cys Leu Asp Arg Ala Val Ser Ile Val
 305 310 315 320
 Phe Val Pro Cys Gly His Leu Val Cys Ala Glu Cys Ala Pro Gly Leu
 325 330 335
 Gln Leu Cys Pro Ile Cys Arg Ala Pro Val Arg Ser Arg Val Arg Thr
 340 345 350
 Phe Leu Ser
 355

<210> 45

<211> 255

<212> PRT

<213> Homo sapiens

<400> 45

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Met Gly Pro Lys Asp Ser Ala Lys Cys Leu His Arg Gly Pro Gln Pro
 1           5           10           15
Ser His Trp Ala Ala Gly Asp Gly Pro Thr Gln Glu Arg Cys Gly Pro
          20           25           30
Arg Ser Leu Gly Ser Pro Val Leu Gly Leu Asp Thr Cys Arg Ala Trp
      35           40           45
Asp His Val Asp Gly Gln Ile Leu Gly Gln Leu Arg Pro Leu Thr Glu
      50           55           60
Glu Glu Glu Glu Glu Gly Ala Gly Ala Thr Leu Ser Arg Gly Pro Ala
65           70           75           80
Phe Pro Gly Met Gly Ser Glu Glu Leu Arg Leu Ala Ser Phe Tyr Asp
          85           90           95
Trp Pro Leu Thr Ala Glu Val Pro Pro Glu Leu Leu Ala Ala Ala Gly
          100          105          110
Phe Phe His Thr Gly His Gln Asp Lys Val Arg Cys Phe Phe Cys Tyr
          115          120          125
Gly Gly Leu Gln Ser Trp Lys Arg Gly Asp Asp Pro Trp Thr Glu His
          130          135          140
Ala Lys Trp Phe Pro Leu Ser Val Pro Ala Pro Val Lys Arg Lys Arg
145          150          155          160
Leu Cys Pro Gln Cys Ala Gly Asp Ser Leu Pro Ala Ala Gly Leu Leu
          165          170          175
Gly Pro Val Gly Arg Thr Gly Arg Arg Ser Pro Cys Gly Pro Leu Arg
          180          185          190
Ser Gln Gly Cys Gly Gly Ala Ala Ala Ala Ala Gly Gly Glu Asp
          195          200          205
Val Gln Gly Val Pro Gly Pro Arg Arg Val His Arg Leu Cys Ala Val
          210          215          220
Arg Pro Pro Gly Leu Cys Val Cys Pro Arg Pro Ala Ala Val Pro His
225          230          235          240
Leu Gln Ser Pro Arg Pro Gln Pro Arg Ala His Leu Pro Val Leu
          245          250          255

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<210> 46

<211> 251

<212> PRT

<213> Homo sapiens

<400> 46

Met	Leu	Gly	Ala	Arg	Leu	Arg	Leu	Trp	Val	Cys	Ala	Leu	Cys	Ser	Val
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Cys	Ser	Met	Ser	Val	Leu	Arg	Ala	Tyr	Pro	Asn	Ala	Ser	Pro	Leu	Leu
			20					25					30		
Gly	Ser	Ser	Trp	Gly	Gly	Leu	Ile	His	Leu	Tyr	Thr	Ala	Thr	Ala	Arg
			35				40					45			
Asn	Ser	Tyr	His	Leu	Gln	Ile	His	Lys	Asn	Gly	His	Val	Asp	Gly	Ala
			50				55				60				
Pro	His	Gln	Thr	Ile	Tyr	Ser	Ala	Leu	Met	Ile	Arg	Ser	Glu	Asp	Ala
65					70					75				80	
Gly	Phe	Val	Val	Ile	Thr	Gly	Val	Met	Ser	Arg	Arg	Tyr	Leu	Cys	Met
			85						90					95	
Asp	Phe	Arg	Gly	Asn	Ile	Phe	Gly	Ser	His	Tyr	Phe	Asp	Pro	Glu	Asn
			100					105					110		
Cys	Arg	Phe	Gln	His	Gln	Thr	Leu	Glu	Asn	Gly	Tyr	Asp	Val	Tyr	His
			115				120					125			
Ser	Pro	Gln	Tyr	His	Phe	Leu	Val	Ser	Leu	Gly	Arg	Ala	Lys	Arg	Ala
			130				135					140			
Phe	Leu	Pro	Gly	Met	Asn	Pro	Pro	Pro	Tyr	Ser	Gln	Phe	Leu	Ser	Arg
145					150					155				160	
Arg	Asn	Glu	Ile	Pro	Leu	Ile	His	Phe	Asn	Thr	Pro	Ile	Pro	Arg	Arg
			165						170					175	
His	Thr	Arg	Ser	Ala	Glu	Asp	Asp	Ser	Glu	Arg	Asp	Pro	Leu	Asn	Val
			180					185					190		
Leu	Lys	Pro	Arg	Ala	Arg	Met	Thr	Pro	Ala	Pro	Ala	Ser	Cys	Ser	Gln
			195				200					205			
Glu	Leu	Pro	Ser	Ala	Glu	Asp	Asn	Ser	Pro	Met	Ala	Ser	Asp	Pro	Leu
			210				215				220				
Gly	Val	Val	Arg	Gly	Gly	Arg	Val	Asn	Thr	His	Ala	Gly	Gly	Thr	Gly
225					230					235				240	
Pro	Glu	Gly	Cys	Arg	Pro	Phe	Ala	Lys	Phe	Ile					
			245						250						

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C07K 14/17; C12N 5/10, 15/12, 15/63, 15/64

US CL : Please See Extra Sheet.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 530/350; 536/23.1, 23.5, 24.3, 24.31; 435/69.1, 71.1, 71.2, 471, 325, 252.3, 254.11, 320.1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 96/41523 A1 (YEDA RESEARCH AND DEVELOPMENT CO., LTD.) 27 December 1996 (27/12/1996), see entire document, especially pages 7-9.	1-2, 5-9

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A document defining the general state of the art which is not considered to be of particular relevance	*X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*E earlier document published on or after the international filing date	*Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*A document member of the same patent family
*O document referring to an oral disclosure, use, exhibition or other means	
*P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

16 APRIL 2001

Date of mailing of the international search report

13 JUN 2001

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

PREMA MERTZ

Telephone No. (703) 308-0196

A. CLASSIFICATION OF SUBJECT MATTER:

US CL :

530/350; 536/23.1, 23.5, 24.3, 24.31; 435/69.1, 71.1, 71.2, 471, 325, 252.3, 254.11, 320.1

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING

This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claims 1-2, 5-9, drawn to a nucleic acid of SEQ ID NO:1 encoding a protein of SEQ ID NO:24, a vector, a host cell, a method of making the protein and the protein of SEQ ID NO:24.

Group II, claims 3-4, drawn to an antibody that binds the protein of SEQ ID NO:24.

The inventions listed as Groups I-II do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Pursuant to 37 C.F.R. § 1.475 (d), the ISA/US considers that where multiple products and processes are claimed, the main invention shall consist of the first invention of the category first mentioned in the claims and the first recited invention of each of the other categories related thereto. Accordingly, the main invention (Group I) comprises the first-recited product, a nucleic acid encoding a protein of SEQ ID NO:24, a vector, a host cell, a method of making the protein of SEQ ID NO:24, and the protein of SEQ ID NO:59. Further pursuant to 37

C.F.R. § 1.475 (d), the ISA/US considers that any feature which the subsequently recited products and methods share with the main invention does not constitute a special technical feature within the meaning of PCT Rule 13.2 and that each of such products and methods accordingly defines a separate invention.

This application contains claims directed to more than one species of the generic invention. These species are deemed to lack Unity of Invention because they are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for more than one species to be searched, the appropriate additional search fees must be paid. The species are as follows:

the polynucleotides set forth in SEQ ID NO:1-23 encoding the polypeptides set forth in SEQ ID NO:24-46.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/04703

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-2, 5-9 (SEQ ID NO:1, 24)

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.